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Report on Events Related to the Capsizing & Sinking of *L'ACADIEN II* Off the Coast of Cape Breton 28/29 March 2008



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**REPORT ON EVENTS RELATED TO THE
CAPSIZING & SINKING OF *L'ACADIEN II*
OFF THE COAST OF CAPE BRETON 28/29 MARCH 2008**

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EXECUTIVE SUMMARY

On the morning of March 29, 2008, a sealing vessel, the L'ACADIEN II, capsized after hitting a large chunk of ice while being towed by a Canadian Coast Guard vessel in the Gulf of St. Lawrence. Four men lost their lives in the accident – three victims were recovered from the overturned hull and one victim was lost at sea.

The Canadian Coast Guard commissioned this independent investigation to report on the sequence of events that led to the accident; the events that happened directly afterwards; whether Coast Guard policies and procedures had been followed and whether they were adequate. The investigation was to also make recommendations to the Coast Guard to prevent, to the degree possible, such a tragedy from happening again.

A tremendous amount of research was conducted in the preparation of this report. Eyewitnesses were interviewed and detailed transcripts were reviewed. Because there was no video record of the accident, these eyewitness accounts were key to the investigation.

Additional research was also conducted to fill in any gaps in the recollections of the witnesses as well as to shed further light where accounts of the accident varied. A naval architect was hired to focus on ship stability and assess potential scenarios that could have caused the L'ACADIEN II to hit the ice and capsize. Six separate towing trials were conducted at sea to better understand the dynamics of the tow during the accident and the potential causes of the vessel's capsize.

The chronology of the accident is presented in full detail in the report. On the morning of March 28, the L'ACADIEN II (home ported in Cap aux Meules on the Magdalen Islands) was on the east coast of Cape Breton attempting to reach a large concentration of seals, when it suffered rudder damage while manoeuvring in heavy ice. Unable to continue unassisted, the master of the L'ACADIEN II called for assistance at 1400. The Canadian Coast Guard vessel, DES GROSEILLIERS, responded to the call and two

engineers boarded the L'ACADIEN II to assess the damage, concluding that the rudder could not be repaired at sea.

The DES GROSEILLIERS was then called to a higher priority Search and Rescue (SAR) case and departed. Around 1500, the L'ACADIEN II was advised to seek assistance from Coast Guard Radio in Sydney to request an escort. Although there were several communications with the L'ACADIEN II, it was hours before the full extent of L'ACADIEN II's damage was understood as well as the level of assistance it required.

By 1859, Sydney Coast Guard Radio and the JRCC (Joint Rescue Coordination Centre) in Halifax more fully understood the urgency of the situation that was developing on the ice. Of particular concern were the number of damaged, ice-bound vessels and the weather forecast warning of a potential gale and onshore winds. After deliberations with a variety of Coast Guard offices, the JRCC dispatched the Canadian Coast Guard vessel, CCGS SIR WILLIAM ALEXANDER, to the scene.

The CCGS SIR WILLIAM ALEXANDER began towing the L'ACADIEN II at approximately 2250. The CCGS SIR WILLIAM ALEXANDER also took another sealing vessel, the MADELINOT WAR LORD, under escort since it had been damaged in the ice and was taking on water. The three vessels traveled in an easterly direction at a slow speed, averaging 2.6 knots (4.8 Kph, 3 Mph), through pack ice that was often 8/10^{ths} concentration.

The towing of the L'ACADIEN II continued for over two hours, proceeding slowly through challenging ice conditions until 0100 in the morning on March 29, when the three vessels entered an open lead in the ice. Soon after, the L'ACADIEN II sheered on the port quarter (the left side) of the CCGS SIR WILLIAM ALEXANDER, struck a large chunk of floating ice and capsized.

Two of the six crewmembers on board the L'ACADIEN II escaped and were rescued by the nearby MADELINOT WAR LORD. Four crewmembers were missing and a frantic rescue effort ensued, lasting for several hours. Search and Rescue Technicians from Canadian Forces Base Greenwood arrived to assist, and four divers conducted a series of dives, recovering three victims from the overturned hull. One victim was never found.

A number of key observations emerged from this investigation and are covered in detail in the report: the risks taken during the tow; how the tow was conducted; the factors that caused L'ACADIEN II to strike the ice and the factors that caused it to capsize.

From these key observations, the report arrives at eight recommendations for the Coast Guard to consider:

- conduct a full review of towing requirements, policies, processes, training and equipment
- aggressively seek, implement and apply technological methods which deliver a "common operating picture"
- conduct a reassessment of east coast waters' jurisdictional apportionment
- refine organizational planning and risk management processes for the oversight of east coast activities

- promote the concept of record-keeping and analysis, as well as the value of shared professional lessons learned
- renew and reinvigorate engagement of the client base
- propose and participate in a coherent alignment of cross-Departmental jurisdictional domains within Canada's east coast waters
- propose a review of the regulatory process, standards and inspection regime for vessels working and operating in ice with the applicable authoritative partners in the appropriate Departments

The eight recommendations listed above consist of both systemic and functional recommendations, each one described more fully in the report. Survivors, witnesses, family members, and the maritime community at large, all have a stake in their implementation, as do the many people who contributed to the report. While nothing can reduce the risks of life at sea to zero, the advice offered is meant to enhance operations and mitigate these risks.

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CHAPTER 1 – INTRODUCTION

1.1 ASSISTANCE TO THE INVESTIGATION

At the outset of this report, the author wishes to acknowledge the assistance of numerous contributors to this complex investigation. Numerous Coast Guard personnel provided testimony and support to this effort. Other federal agencies including the Department of Fisheries and Oceans, the Department of National Defence, the Transportation Safety Board and Transport Canada added their efforts.

In particular, the survivors, the families of the victims and certain members of the sealing community all gave profoundly of themselves to enable this effort. Throughout the process, the desire to uncover all the facts possible in an effort to accurately describe what happened and to learn from the incident was evident in every exchange.

1.2 BRIEF SUMMARY OF THE INCIDENT

On 28 March 2008, the 12.5 m (41 foot) sealing vessel L'ACADIEN II found itself damaged in what were exceptional ice conditions along the northeast coast of Cape Breton. The master contacted the Canadian Coast Guard for assistance. Both CCGS DES GROSEILLIERS and CCGS SIR WILLIAM ALEXANDER spent time on scene, with the latter vessel taking the L'ACADIEN II, which had damaged its steering gear, under tow in the late hours of 28 March. At approximately 01:00 (local Atlantic time will be used throughout unless otherwise noted) on the morning of 29 March, the L'ACADIEN II was under tow and another sealer, the MADELINOT WAR LORD, was under escort close astern¹.

A change in the ice conditions which had been experienced for the previous two hours occurred as the group entered a clear lead and comparatively open water. The L'ACADIEN II took a measurable

sheer to port, struck a solid and sizable floe of rafted ice, and was forced onto her starboard side by the diagonal pull of the towing hawser. Before the towing hawser could be cut, allowing the vessel to right herself, the imparted 90+/- degree roll allowed liquid cargo and equipment to shift and flooding through window seams and the main cabin door. This, along with the continued strain on the hawser, precluded any righting moment. L'ACADIEN II quickly filled with water and capsized, with strain still on the towing hawser. Of the six aboard, two crewmembers narrowly escaped; three were caught in the vessel, their bodies recovered by divers; one crewmember was not found after the incident. As of this writing, he remains lost at sea.

1.3 TERMS OF REFERENCE

The Terms of Reference (ToRs) for this independent internal investigation were conveyed on April 4, 2008, with a subsequent clarification delivered on April 14. The ToRs required an independent and unbiased assessment and review of the circumstances leading to and following the capsizing of L'ACADIEN II. The key areas for determination and assessment in the ToRs were:

- the sequence of events that led to and followed the occurrence;
- how the incident occurred, why the incident occurred;
- whether there was compliance with: Canadian Coast Guard (CCG) policies, procedures and work practices including the CCG Towing Policy; general practices for non-Search and Rescue (SAR) assistance to vessels; the common practices of good seamanship; and regulatory and industry standards; and
- any other matters related to the occurrence that were deemed necessary and relevant to ensuring a full and clear understanding of the occurrence.

¹ The MADELINOT WAR LORD was stationed just meters astern or behind the L'ACADIEN II, described as "within a stone's throw" by the master of the vessel.

In addition to ascertaining the course of the events surrounding the incident, the goals of the investigation were related to making preventative safety-oriented recommendations so as to preclude, to the degree possible, such a tragedy from occurring again. Neither direct blame nor implicit responsibilities were sought by the process. Further commentary on the TORs, the investigation team and the conduct of the investigation is included in **Annex A**.

CHAPTER 2 – CONTEXT FOR THE INCIDENT

The Gulf of St. Lawrence is a well-utilized ocean seaway bordered by five provinces, utilized by a range of resource-exploitation industries and plied by significant international shipping. The presence of the islands of St. Pierre and Miquelon, sovereign French soil, signifies that this is not an exclusively Canadian domain. It makes up a commercial complex of significant proportions, represented by a range of fisheries, oil and gas exploration and recovery, tourism and transportation. It represents a complex mix of internal waterways, coastal waters and international waters within the Canadian exclusive economic zone².

Numerous legal and regulatory jurisdictions come into play in the region. Within the Federal Department of Fisheries and Oceans alone, numerous rule-sets, policies, laws and organizational silos have interests, application or mandates in the region, not all coherently inter-related or aligned.

Departmentally, areas of responsibility and *ownership* are described by a layered set of boundaries for Search And Rescue (SAR) zones, Conservation & Protection regions, Fisheries areas and Coast Guard regions. Silos exist which are sometimes geographic, sometimes activity-based. The Coast Guard itself is a Special Operating Agency³.

Where fifteen years ago the range of the Federal fleet within the current organizational realm of Fisheries and Oceans was seen as distinct and specialized by activity, reorganization and amalgamation have brought a sea change in the appearance of multi-tasking. The down-size of Government in the deficit-fighting years of the '90s had impact on resource management and the search for efficiencies has clearly been a consistent Federal theme. A consequence worth noting is that from seaward, in

the eyes of the seagoing community and in particular the fishery, the red-hulled Coast Guard vessel is now, as often as not, an enforcer as opposed to a rescuer⁴. This speaks particularly to the realities of resource management for the Federal fleet and the aspect of multi-tasking. Vessels are assigned one role and then another, with regularity and sometimes with rapidity. It is not uncommon for a vessel tasked to 30-minute SAR response to in fact be conducting ice clearing or some other activity while awaiting a potential call. This is generally manageable for the crews involved. This is also efficient and cost effective for resource managers concerned with overall sea-day availability and the cost of running the fleet, but it does have potential consequences in terms of vessel placement and prospective response times. The key to success in managing the challenges of fleet assets and taskings is effective and ongoing internal liaison so as to manage expectations amongst stakeholders, including the customer, that being the maritime community at large.



Figure 1: Distribution of Canadian Coast Guard and other Federal vessels on 28 March 2008

² The ocean approaches to Canada represent some of the most complex jurisdictional domains within Canada's sovereign territory. From the port to the limit of the 200 nautical mile Exclusive Economic Zone, municipal, provincial, federal and international regulations come into play.

³ See <http://www.dfo-mpo.gc.ca/> for the Department of Fisheries and Oceans and Canadian Coast Guard websites.

⁴ A number of sealers interviewed spoke to this issue, lamenting the reductions in a variety of Federal resources supporting the fishery, from radio stations to vessels at sea. Some commented that where once the red hulls were there to save them, they now often seem more intent on policing them.

The coastal communities of the region, in whatever the Province, are largely rural and view their livelihood on the sea as both traditional and a right. Family roots and customary livelihood often go back generations. From years gone by, there remains in the coastal ports and villages of the Region an expectation of support from Government. Less related to entitlement than a simple desire for assistance to get to sea to ply their trade; the sea is a highway and they expect it to be cleared so they can get to work. In the post-reorganization here and now, there remain some misunderstandings in these communities as to the multi-layered mandate, roles and tasks of what is often perceived to be a singular

Federal fleet. At the time of the incident, twenty-eight Coast Guard vessels were at sea or available in the waters of Quebec, the Maritimes and Newfoundland and Labrador, known as the Atlantic Zone. There were ten in the waters adjacent to the Gulf. This represents a significant resource investment by any measure, and is remarkable for the rate of traffic normally at hand during this time of year, but one still challenged by scale of geography and pace of activity.

It should be noted that traversing and working in coastal ice zones is fairly common for the communities of the region and for the east coast's Coast Guard,

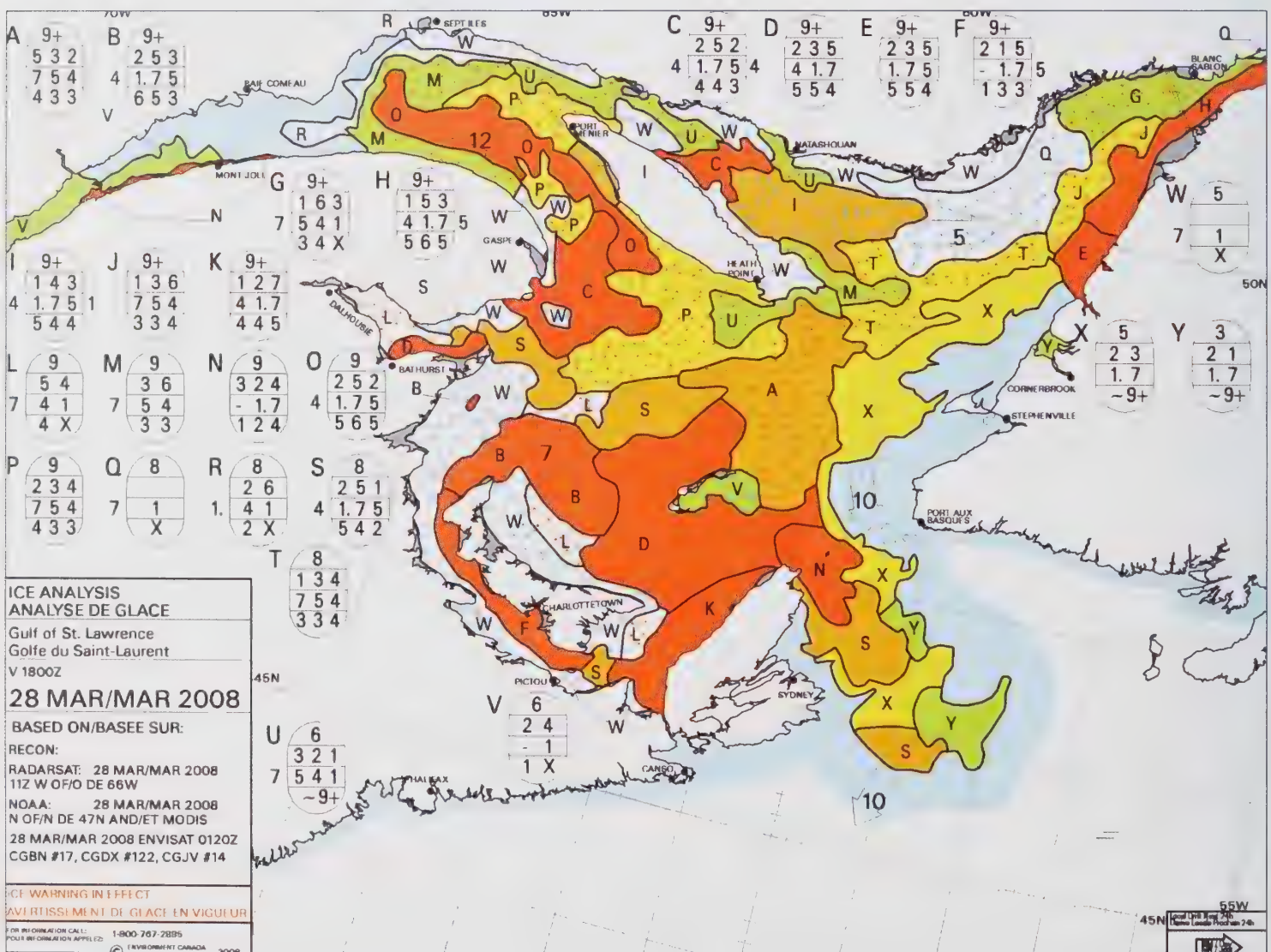


Figure 2: Ice Conditions on 28 March 2008

though rare for the average sea-going crew around the world. Any ice, whether iceberg, growler, floe or cake is potentially dangerous and is to be approached with caution and respect. Movement, due to sea or swell, thickness and stability, each demand an awareness and nimbleness unnecessary in the shore environment, whether on board or for those who venture out on the ice. Night-time conditions and fog make navigation challenging and sometimes dangerous. Because of the physical attributes of ice and radio waves and the effects of environmental conditions on radar signals, vessel radar is measurably compromised and often inadequate in displaying ice to the mariner⁵. Selection of a course in ice during reduced visibility is sometimes more guess than decision.

As noted in Figure 2 above, the ice chart for 28 March, the winter of 2007/08 delivered a comparatively significant ice mass in the Gulf of St. Lawrence and approaches. Though certainly not unprecedented, ice conditions off the Magdalen Islands and Cape Breton in March were not the norm which the seagoing community had experienced over the ten previous seasons. Extensive ice had been recorded in March

of 2003 and to a lesser extent in 2004 and 2005. This year's ice was challenging in that the shelf of first year ice completely enveloped the Magdalen Islands, a condition not seen in the ten previous seasons. Ice conditions in turn had consequences for both the start of the seal breeding season and the ability of sea-going commerce, including the sealing fleet, to make for sea.

2.1 FACTORS AT PLAY ON 28 MARCH

Two dynamics influenced the movements of the L'ACADIEN II and a measurable portion of the remainder of the sealing fleet towards the waters off northeast Cape Breton: the condition of the ice and the distribution of developing and sometimes detailed information regarding the seal herd. CCGS DES GROSEILLIERS was specifically assigned to observe the hunt and assist where required. The main concentration of seals was known to be off Cheticamp, along the west coast of Cape Breton, but the ice conditions precluded the sealers reaching this area.

CCGS DES GROSEILLIERS assisted in breaking out a group of sealers trapped in the ice and escorted them

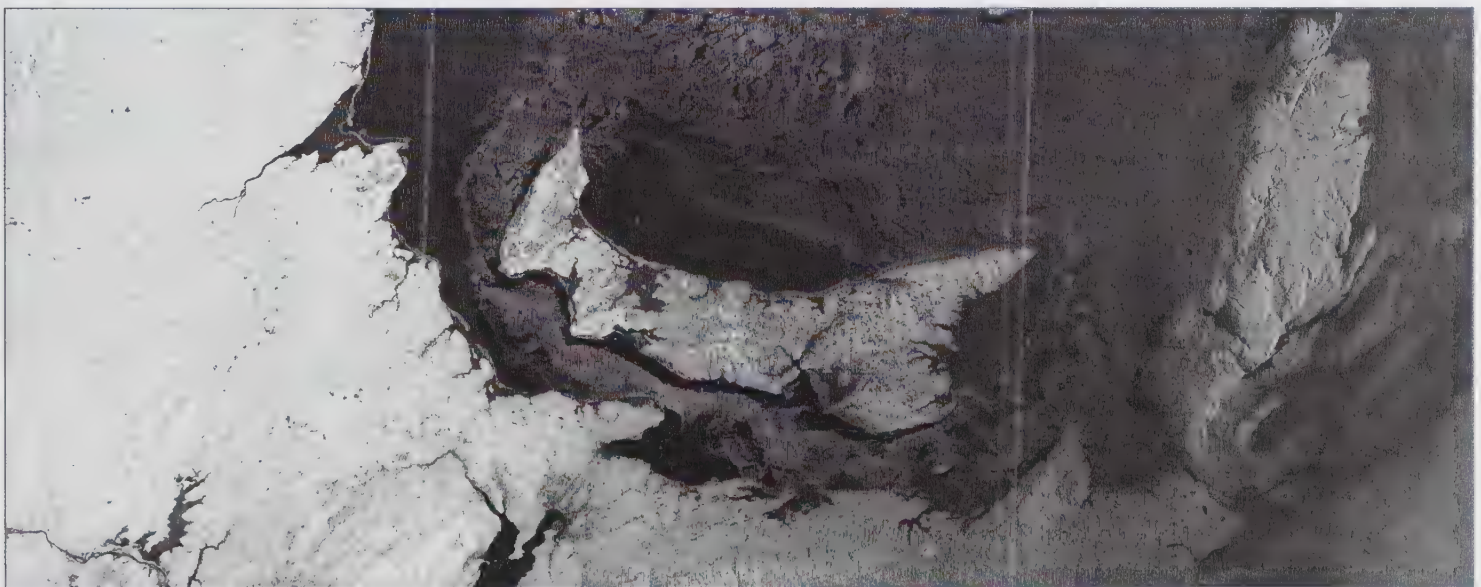


Figure 3: Satellite imagery of the ice pack on 29 March 2008

⁵ Ice is a poor reflector and has the capacity to actually absorb radar energy. Even icebergs are notorious for poorly displaying on radar displays. The face of a wave is more reflective than an ice chunk at sea. Night lighting and an efficient lookout are absolute requirements when transiting in the proximity of ice.

to an area of less pressure where more open water leads might be found, in the hopes they would find an alternate concentration of seals that would allow them to resume the hunt. The crew of the L'ACADIEN II followed the perceived path of least resistance as provided by CCGS DES GROSEILLIERS towards their best guess in seeking a concentration in the herd so as to achieve their quota in the hunt, making for St. Paul Island and then down into Sydney Bight⁶. This area is viewed with some caution, particularly by mariners in

the fishing community, and for some is viewed with a sense of foreboding given the number of vessels lost in this quarter⁷. The Coastal Pilot, the Canadian Hydrographic publication which describes Canadian waters for mariners in some detail, describes the approaches to Sydney as being subject to major ice conditions and to measurable ocean and tidal currents⁸, factors not uncommon for the region as a whole. It does specifically caveat the dangers of a northeast gale, noting that being trapped in rafted

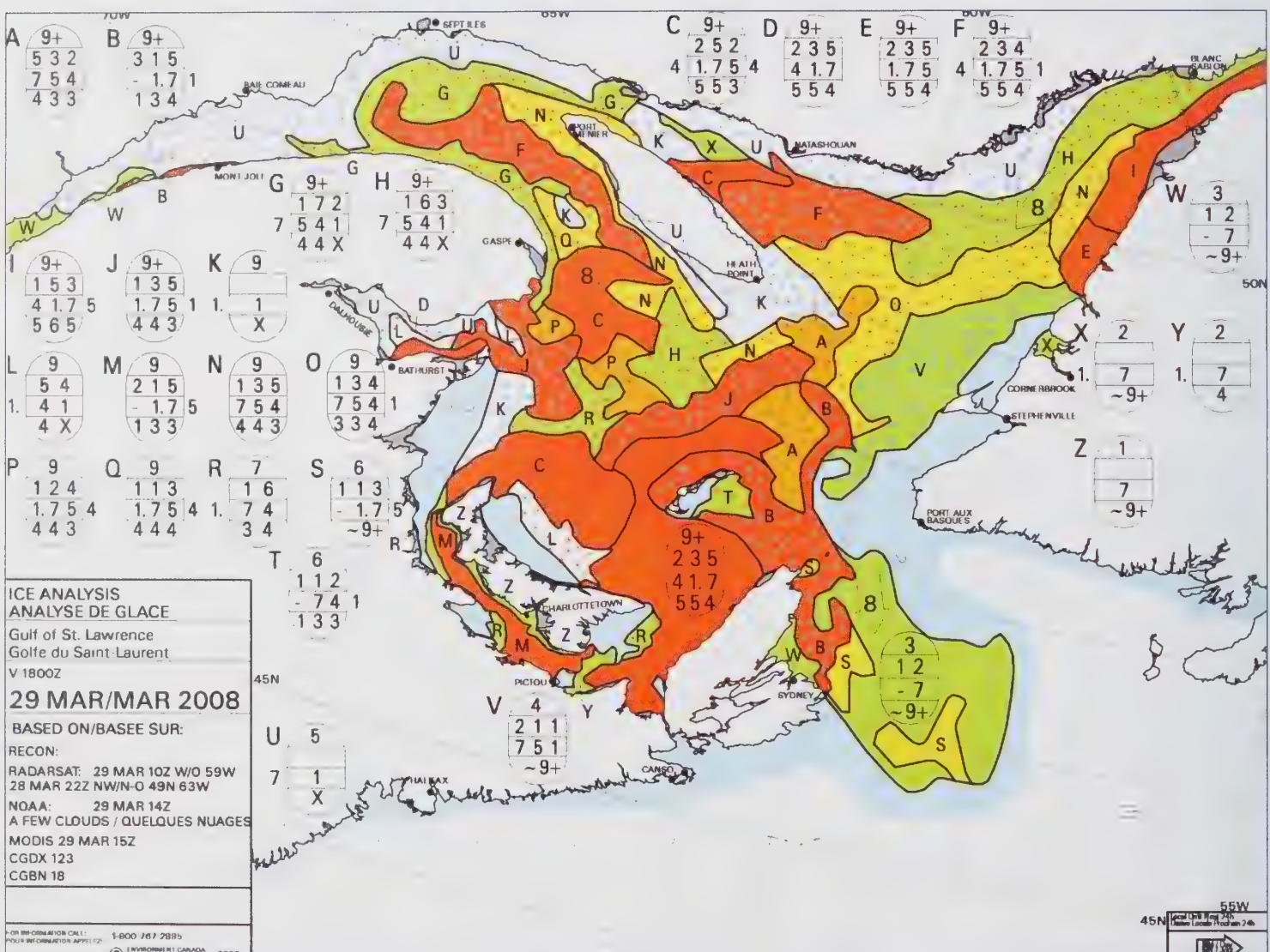


Figure 4: Ice Conditions on 29 March 2008

⁶ One survivor described the challenges of the ice and the periodic efforts of the CCGS DES GROSEILLIERS to assist the sealers. This included some escort work as well as occasionally breaking out vessels which had become icebound.

⁷ One sealer described the advice he had received from an ocean-going mariner to never enter this area. Several mentioned that they had concerns as they approached Sydney Bight and couldn't understand why CCGS DES GROSEILLIERS was leading them there.

⁸ Currents can be wind generated, tidal based on the cycles of the moon, or induced rivers flows as is the case in the Gulf of St. Lawrence.

ice or run onto a lee shore and aground can result if caution is not taken to ensure sufficient sea-room.

At the time of the incident, the pack ice off the Cape Breton shore was largely reported as 8-9/10th with varying thickness, but mostly greater than 15cm. Some clear leads were reported, and indeed these are visible in the satellite imagery of the day. On the afternoon of 28 March the weather sensors at St. Paul Island, to the northeast of Cape Breton, reported winds from northwest to northerly at 5 to 10 knots, with a forecast of winds shifting to north-northeast that evening. No swell was evident on the ice. A set, the combined effects of wind drift and current, was observed to the southwest in the afternoon of 28 March, while the set had shifted at the time of the

accident to running in a south-easterly direction at the position of the L'ACADIEN II at about 1 knot. The meteorological forecast issued at approximately 20:00 warned of onshore winds of up to 20 knots, with freezing spray conditions and occasional snow. The ice chart at Figure 4 shows the effect of the onshore winds on the ice, as compared to the ice profile at Figure 2. As well, the Sunday outlook was for strong to gale force northwesterlies.

In discussing the context of the event, it is pertinent to consider the particulars of the two key vessels involved. The L'ACADIEN II was a 12.56 m long multi-purpose fishing vessel, configured for sealing at the time of her capsizing. With a beam of 4.88 m and a draft of some 1.6 m laden, she had the typical boxy



Figure 5: L'ACADIEN II on the afternoon of 28 March 2008

configuration of vessels of her type, built for sea-going robustness and capacity, not for speed. Her hull, made of aluminium and reinforced for ice, was stubby, broad and flat-bottomed. At approximately 35 gross tons, powered by a 300 horsepower diesel engine driving a single right-hand-turning shaft, the vessel was capable of up to 10 knots. The stability curves show that she had a design that was stable, though she had undergone some modifications from her original build related to ice strengthening. Essentially, this would have put weight low in the vessel, notionally an enhancement to stability. It should be stated that an engineering review of the stability curves for L'ACADIEN II revealed no concerns.

The CCGS SIR WILLIAM ALEXANDER is a high-endurance multi-purpose vessel and is considered a light icebreaker. At 78.39 m in length, 16.2 m in breadth, drawing 5.75 m and at 3727 gross tons, this is a powerful ocean-going vessel. With diesel-electric propulsion delivering roughly 7000 horsepower or 5250 kilowatts to a twin screw configuration, a normal cruising speed of 13.7 knots (25.37 km/h) (29.63 km/h). The vessel is designed to utilize the could be pushed to a maximum speed of 16 knots significant power available to move effectively through winter ice, not race. With nearly a full load of fuel, once underway she would build some considerable momentum, meaning the ship would not stop quickly.



Figure 6: CCGS SIR WILLIAM ALEXANDER

For those uninitiated to ships and the sea, it is worth considering these vessels in a more familiar comparative context. A modern ocean-going container ship is the sea-going equivalent of a highway tractor-trailer with dual rig, fast but not very nimble. A naval destroyer is akin to a Formula 1 racer in terms of speed, power and nimbleness. A fishing vessel such as L'ACADIEN II is very much like a farm tractor and the CCGS SIR WILLIAM ALEXANDER is a combination of snow-plough, tow-truck and road grader, a powerful, flexible, multi-use platform. As pertains to the tow, the CCGS SIR WILLIAM ALEXANDER represented a vessel over six times as long, 100 times the tonnage and some 17 times the horsepower of the L'ACADIEN II. It represented the equivalent of a Mack truck towing a golf cart.

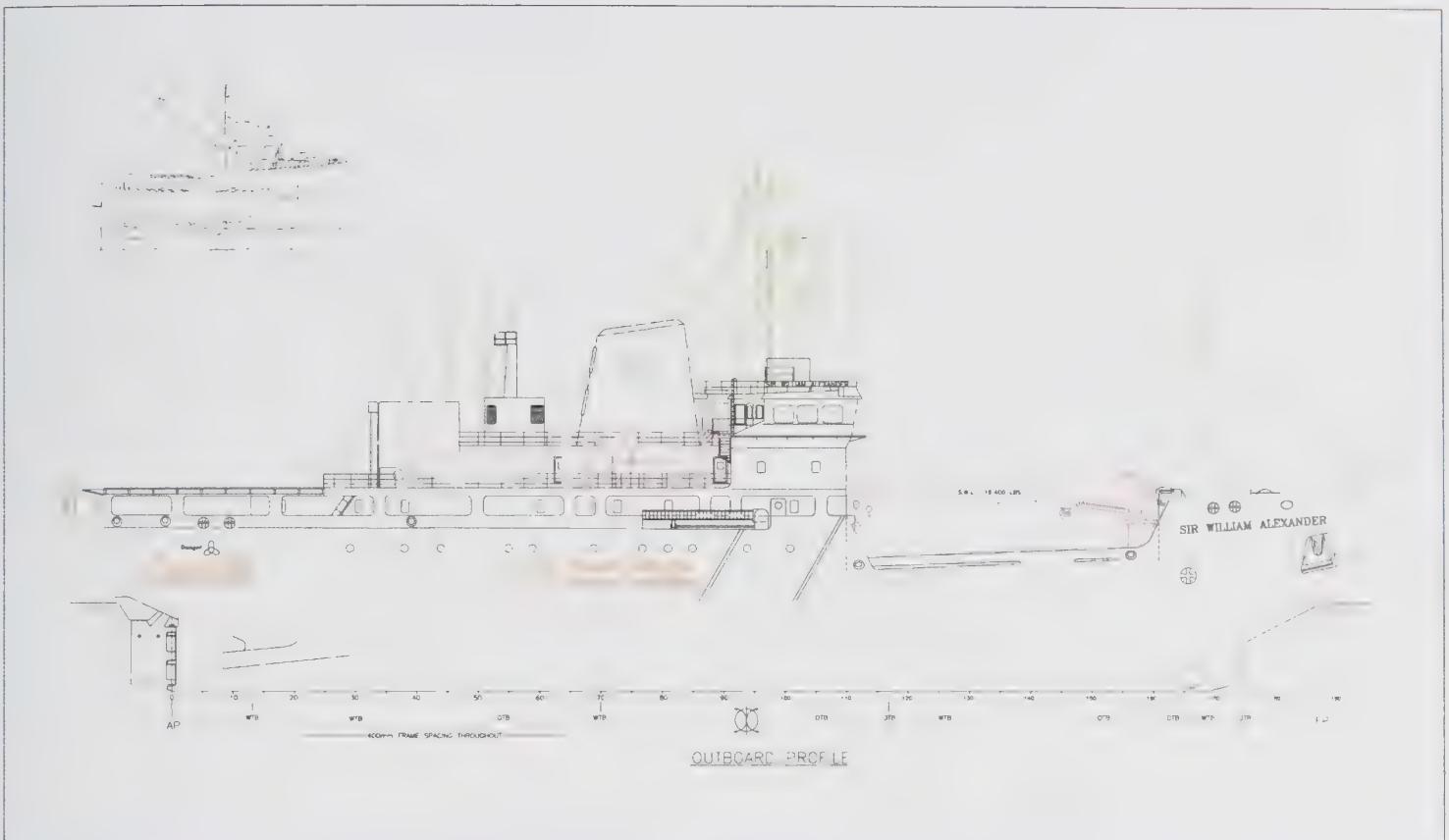


Figure 7: Schematic side view of CCGS SIR WILLIAM ALEXANDER and L'ACADIEN II, delivered to scale

F/V L'ACADIEN II

Build in 1988
 Dimension: 13.7 m X 4.88 m X 2.15 m
 Net Tonnage: 17.73 TONS
 Official Number: 811285

CCGS SIR WILLIAM ALEXANDER

Build in 1987
 Dimension: 83 m X 16.2 m X 5.75 m
 Net Tonnage: 1534.61 TONS
 Official Number: 607685

CHAPTER 3 – CONCEPTS AT PLAY

Having set the scene in general, it is important to describe key concepts which served as the filters for viewing the sequence of events and the subsequent analysis of the L'ACADIEN II incident. These lenses are required to a degree because of the unique nature of an accident as an event. They are particularly applicable as a result of the maritime environment in which events took place.

3.1 PERSPECTIVE

In setting out to collect the story of the L'ACADIEN II as fully and accurately as possible, the investigation team was cognizant of the human and behavioural factors that may have been at play during and after the accident. No video rendition of the event was available. The story could only be arrived at through the eyes and the memories of those who were there. The pace of events, night-time conditions, the glare of the lights, fatigue and shock, all potentially served to impact awareness and skew priorities of action during the incident as well as influence the capacity for recollection afterwards, whether immediately or over the course of time.

The physical and emotional factors of fear and adrenaline, vantage point and proximity, touched each participant differently. These factors affected point of view, peripheral vision and each individual's cone of awareness⁹ and each participant's capacity to record and recollect¹⁰. Some remembered perfectly the images and choices they faced. Others remember more blur than detail. The imperative of dealing with a string of individual emergency situations caused some to focus and forget, as they moved from one event shock to another. Survival instinct and reflex responses all played a part in the conduct of the event.

In situations where disagreement was not easily resolved or where data or testimony was insufficient, reconstruction, trials and demonstrations were utilized to help fill the gaps.

3.2 THE SAFE PRACTICE OF SEAMEN AND RISK

It is important to fully appreciate the concept allied to what is described as the standard of conduct related to the safe practice of seamen. The concept is not defined by a line, where one side is right and the other is wrong. It is a zone, fairly broad in scope, shaped by tradition, practice, experience, culture, environment and local conditions. While excellent manuals abound, none can address every circumstance for every scenario. Individual ships and individual teams are often wont to develop local practice which, though based on sound written doctrine, is just as likely to be evolved and passed along through word of mouth. While operating at sea, it is rare to find a single answer or solution to a generic problem, challenge or evolution. When asking a sea-going officer, an experienced seaman, an experienced fisherman or sealer for an opinion related to conduct at sea, the response will begin with *'well, it depends'* as often, if not more, than *'there's only one way.'*

This is not to suggest for an instant that an ad hoc approach is an acceptable basis for the conduct of operations and evolutions at sea, as nothing could be further from the truth. Ad hoc effort does not survive long at sea. It does speak to the fact that rote adherence and *one-size-fits-all* approaches are equally worthy of rejection, since life at sea rarely serves up risk-laden scenarios in a predictable fashion. The professional and prudent mariner will base his or her decisions on book knowledge, theory, experiential learning and a keen observation of the issues and conditions at hand. The key factor in both

⁹ It is recognized that urgent life-and-death events often cause a certain 'tunnel-vision' in those involved. This is a normal physiological effect when undergoing abnormal events.

¹⁰ A key element of each witness interview was the establishment of the level of fidelity the witness had in his own recollections. These, naturally, varied widely. Witnesses were sincere in their responses, striving to provide detail to the overall understanding of events while being clear as to what was memory and what was 'impression'.

effectiveness and survival is often experience, commonly described as a *seaman's eye*. This describes not only the enhanced powers of observation that comes from years at sea, the seeing and doing that comes with them, but the sixth sense, the *feeling in the water*, that comes from having taken risks and sometimes living close to the edge. It delivers the sense of confidence required to assume risk comfortably as well as the inner sense that it may be time to just back away. What it never offers is the easy answer when conditions *demand* action that may well be beyond an individual's, or a crew's, scope of experience. This is a particular reality of life at sea where the environment, the sea itself, is almost invariably the most dynamic source of danger, often with no options to decline the risks that danger represents.

A walk along the edge of a pier or jetty at a busy port will entail risk; even for those too naive to understand the position they are in. Life at sea not only demands understanding but insists in fact that one take satisfaction in, or at least become accustomed to and comfortable with, real risk to life and limb almost every moment of every day at sea. For the land-lubber, this is an odd concept often too difficult to fathom. The risk-acceptance point of view runs counter to current trends and societal norms founded in preventative theory and risk-avoidance. This is what makes life at sea special and those who willingly set out to face these risks, whether for profession, profit or leisure, comparatively unique.

Risk is often undertaken knowingly, even willingly, but should never be assumed glibly. A clear understanding of why risk is necessary, the depth of talent and experience at hand to deal with and mitigate the risk situation, as well as a mental if not written formulaic balance of potential outcomes and benefits should be a part of any professional risk analysis. A sage mariner's invocation regarding risk asks; *if you never take a risk when you have the option, how will you ever know you can face risk when there is no choice?* Whatever the guiding calculations regarding risk, the difference between professionalism and recklessness can be a fuzzy line, most especially to those least accustomed to the practice.

CHAPTER 4 – CHRONOLOGY OF EVENTS

The events related to the capsizing of L'ACADIEN II include the activities of several vessels over a period of several days, in addition to the efforts of multiple shore stations such as the Marine Rescue Sub Center (MRSC) in Quebec, the Coast Guard Marine Radio Station in Sydney, the Coast Guard Regional Operations Centre in Dartmouth, NS and the Joint Rescue Coordination Centre in Halifax. A narrative version of the chronology is presented below. A more complete and detailed time-line is available at **Annex E**.

4.1 THE INITIAL VOYAGE OF L'ACADIEN II

The L'ACADIEN II left Cap aux Meules, on the Magdalen Islands, at approximately 18:00 on the evening of Wednesday, 26 March. With an experienced master and a crew of five, the intent was to engage in the seal hunt and achieve the quota which had been assigned just before setting out. It was quickly noted that ice conditions were significant in both density (often 9/10ths) and at times in thickness, indicating rafted ice which had built up during onshore blows.

The conditions off the Magdalens were more severe than most had experienced in home waters. Only the master and an experienced seaman had seen such conditions in local waters before, though not for some years. Some had experienced it further north, when hunting off Newfoundland near the Strait of Belle Isle. The L'ACADIEN II worked through ice making an easterly run to St. Paul Island and then into Sydney Bight, always in search of a concentration of the seal herd. A number of other sealers were in the area and, as is common practice in the fisheries, radio exchanges allowed some to keep track of each other and of conditions. The CCGS DES GROSEILLIERS was also at hand, observing the progress of the hunt, freeing sealers beset by the ice and, over a period of days, escorting the hunt in an eastward direction towards Cape North.

4.2 DAMAGE AND CONNECTING WITH COAST GUARD

By late morning of Friday, 28 March, L'ACADIEN II had taken only three seals. Progress through the ice was slow but spirits were good¹¹. By this juncture, the vessel was some ten nautical miles to the east of Cape North. At approximately 11:00, while working through the ice with some fairly strong forward and aft engine movements, it was noted that the vessel's steering was not responding correctly. Concluding that rudder damage may have occurred while working the ice, the master came across an open lead sufficient for free movement and conducted a cursory steering trial. It was discovered that the vessel's helm could apply a mid-ships, or straight-ahead, rudder action as well as a manoeuvre to port. However, no matter the helm setting, no starboard manoeuvre was achievable. An inspection of the internal steering gear in the after end revealed no damage; in fact all internal workings seemed untouched and operating through a full and normal range of motion. The conclusion was that rudder damage had occurred externally and that whatever form of damage had occurred, it was preventing the rudder from imparting a starboard, or right-hand, turn.

L'ACADIEN II made a radio call on CH 16 seeking assistance. She first attempted to raise the Coast Guard Radio Station at Riviere-au-Renard, and then Sydney. The CCGS DES GROSEILLIERS, on scene in support of the fisheries officers assigned to the hunt, intercepted the transmissions and responded, choosing in turn to close and offer assistance.

4.3 ARRIVAL OF CCGS DES GROSEILLIERS

The CCGS DES GROSEILLIERS, home ported in Quebec City and under the operational control of the Quebec Regional Operations Centre, was tasked exclusively to observe the seal hunt in the Gulf of St. Lawrence zone in support of the Conservation and Protection segment of Fisheries and Oceans, though

¹¹ One survivor recalls the slow pace through the ice but that the mood was positive and that there was optimism for the remainder of the hunt, once the core of the seal herd was located.

remaining available for SAR response in the area. Her role was to observe the conduct of the hunt and conduct enforcement operations. She had Fisheries Officers, RCMP and Sûreté du Québec Officers on board to conduct the task.

By early mid-morning on Friday, 28 March, CCGS DES GROSEILLIERS was assisting several sealers experiencing difficulty manoeuvring towards an area of less densely packed ice, including L'ACADIEN II. Two engineers from CCGS DES GROSEILLIERS made their way to L'ACADIEN II and inspected the internal working of the steering system to assess if they might effect a measure of repair. Confirming the earlier diagnosis, the engineers found nothing amiss internally and shared the conclusion that any fault or damage seemed to lie external to the hull. Determining that he could offer no further assistance, the Commanding Officer of CCGS DES GROSEILLIERS advised the master of L'ACADIEN II to contact Sydney's Coast Guard radio station for further assistance. Having pulled away but remaining in the vicinity, soon after, CCGS DES GROSEILLIERS was tasked to a distress case involving a vessel taking on water, a higher priority than L'ACADIEN II which was not in immediate distress.

CCGS DES GROSEILLIERS left the scene, though the reason for their departure was unclear to the crew of

L'ACADIEN II. L'ACADIEN II's crew resigned themselves to wait for escort, raising coastal radio stations periodically to ensure there was ongoing awareness of their situation. It would be some 4½ hours before L'ACADIEN II was advised that the CCGS SIR WILLIAM ALEXANDER was assigned to their case, causing much misunderstanding and frustration.

Not apparent to the vessels at sea was the fact that the radio station immediately passed the information regarding L'ACADIEN II along to the Joint Rescue Coordination Center (JRCC) and the Coast Guard Ice Office in an effort to tap into the available resources. Requests for updates on possible solutions were in fact sought throughout those 4½ hours. The fact that all the details related to L'ACADIEN II's circumstances was not available to the JRCC contributed to the length of time which passed before resources were dispatched. It was understood by JRCC that L'ACADIEN II had requested an ice escort, a service for which she was a low priority within Coast Guard policies. This, and the fact that this was consistently seen as a case of a breakdown as opposed to a SAR situation – at least in the early stages of this scenario – contributed to the delay in assigning a Coast Guard vessel to the situation.

4.4 ASSIGNMENT OF CCGS SIR WILLIAM ALEXANDER

On the afternoon of Friday 28 March, CCGS SIR WILLIAM ALEXANDER was alongside in Sydney, NS. Under the operational control of the Regional Operations Centre in Dartmouth, NS, the vessel was multi-tasked with SAR response as her primary role and Ice Operations as a key duty until a SAR situation emerged.

The Commanding Officer was aware of a potential security operation as a tentative tasking. The CCGS SIR WILLIAM ALEXANDER had already been doing some ice work, having escorted of the Newfoundland ferry in previous days and having conducted some ice-clearing in Sydney Harbour. The security work for which she was potentially responsible was related to a prospective response to the seal protest.



Figure 8: Photo of the L'ACADIEN II taken by CCGS DES GROSEILLIERS

CCGS SIR WILLIAM ALEXANDER had been given responsibility for primary SAR coverage for SAR sector east¹². The personnel of the JRCC were becoming more aware of the condition of the sealers off Sydney Bight, noting both the number of damaged or ice-bound vessels and the worsening forecast. In judging the potential risks, and in discussion with the staff of the Regional Operations Centre, Dartmouth, SAR coverage, which always has priority, was highlighted over both security and ice taskings and CCGS SIR WILLIAM ALEXANDER was advised.

At 18:59, the JRCC tasked the CCGS SIR WILLIAM ALEXANDER with a specific non-distress SAR case and to provide assistance to a number of vessels beset by ice. The phone call from JRCC with the Officer of the Watch in CCGS SIR WILLIAM ALEXANDER mentioned both the MADELINOT WAR LORD AND THE L'ACADIEN II. It mentioned that the latter had defective steering and may need a tow, or would need to have the crew removed¹³. Getting underway at 19:21, CCGS SIR WILLIAM ALEXANDER made best speed towards Cape North.

The initial plan formed for managing the spectrum of stricken vessels suggested that the CCGS SIR WILLIAM ALEXANDER would close the MADELINOT WAR LORD first, as she was reported as taking on water and seemed to be the immediate priority. As the factors on-scene became clear, this priority shifted. A radio conversation with MADELINOT WAR LORD confirmed that the ingress of water was stemmed by their pumps¹⁴, no emergency pump was required, but an escort to clear water would be required so as not to worsen their condition.

At approximately 20:10, the JRCC provided an update of the complex scenario being played out on the ice and clarified it further for the bridge of the

CCGS SIR WILLIAM ALEXANDER. The description of the circumstances at play detailed an individual vessel called L'ACADIEN II, some seven miles off a lee shore, and included a specific task to tow her clear of the ice and to the nearest port of repair. Soon after, the weather forecast denoting strong north-east winds overnight and a potential gale within 24 hours served to confirm the sequence for the night's work.

At 21:30 JRCC placed L'ACADIEN II on their active SAR case file as a non-distress SAR case. The vessel was not in distress, but was known to be essentially immobile and would be subject to the whims of the worsening forecast if not provided assistance. CCGS SIR WILLIAM ALEXANDER would go directly to the L'ACADIEN II to take her in tow and increase her clearance off the coast before the winds strengthened. MADELINOT WAR LORD and a third vessel, each further off the coast but in need of assistance, would be approached each in turn and brought into escort. The group would be brought to open water with the eventual goal of taking L'ACADIEN II to Sydney, essentially the nearest port of refuge as described in Coast Guard policy, for repair.

4.5 SETTING THE TOW AND MAKING FOR SYDNEY

Arriving on scene at night, the crew of the L'ACADIEN II spotted the lights of the CCGS SIR WILLIAM ALEXANDER approaching from the southeast at approximately 22:30. On a working channel, the master of L'ACADIEN II was advised that CCGS SIR WILLIAM ALEXANDER would approach, come close aboard to port and pass the tow. Working through 9/10ths ice, CCGS SIR WILLIAM ALEXANDER arrived at the stricken sealer, passed roughly 15 m off her port beam, taking way off with the bow of the L'ACADIEN II

¹² As a primary SAR asset, it should be noted that alcohol is not available to the ship's company as dictated in Coast Guard Policies and Orders.

¹³ This conversation, held between the JRCC Watch Officer and the Officer of the Watch in the CCGS SIR WILLIAM ALEXANDER, represents the single reference found in the transcripts to the possibility of removing the crew. Subsequent discussion focused on the task of towing the damaged vessel.

¹⁴ The MADELINOT WAR LORD had initially reported that she was taking on water through the stern tube, a term describing where the engine shaft-line pierces the hull to reach the screw or propeller. A vulnerable spot which is susceptible to leaking, some damage had been caused while manoeuvring in the ice. The ingress of water was measurable but not sufficient to be described as 'flooding'. Pumps on board were stemming the flow and stabilizing the situation. Concern did exist for potential further damage while manoeuvring in the ice and the possibility of further, stronger water ingress. This situation resulted in the request by the master of the MADELINOT WAR LORD to Sydney Coast Guard Radio for assistance in the form of escort to clear water.

some 10 m perpendicular to the stern of CCGS SIR WILLIAM ALEXANDER. Under the supervision of the Chief Officer and the Bos'n, a heaving line was then tossed, reaching across on the first throw. A messenger line followed and then towing gear¹⁵, consisting of a double bridle, attached by a shackle to a towing hawser made of 1.5 inch diameter (3.8 cm) double-braided synthetic nylon similar to Samson braid. The crew on the foredeck of the L'ACADIEN II

illustrated in Figure 9, passed each bridle through a foredeck fairlead then slipped each eye over its own bollard, or bitt, illustrated in Figure 10. The length of the towline was set at approximately 27 m. The assessed horizontal distance which resulted from the gear in use was in the range of 22-24 m, measured from the CCGS SIR WILLIAM ALEXANDER's towing fairlead to the bow of the L'ACADIEN II¹⁶.



Figure 9: The foredeck of L'ACADIEN II

¹⁵ This process was typical of passing equipment at sea, where a succession of larger, and stronger lines are passed, each one lashed or tied to the other, until the heavier equipment is in place.

¹⁶ This calculation takes into account the height differential between the foredeck of the L'ACADIEN II and the towing fairlead, as well as the catenary of the towline, the loop which is formed as the weight of the towline.

With the gear in place, and still working in considerable ice, CCGS SIR WILLIAM ALEXANDER slowly came up in speed to put strain on the tow. The balance between the slow speed which was necessary given the risks associated with the disparate size of the vessels, and the need for headway to make progress through the ice, would be a delicate one. Working through ice and at a speed of about three knots, bare steerage way for a large vessel such as CCGS SIR WILLIAM ALEXANDER, strain was taken on the tow and L'ACADIEN II fell in astern. No evidence suggests that the steering of L'ACADIEN II was locked or lashed, but simply that the rudder was left amidships. CCGS SIR WILLIAM ALEXANDER set a course to make for the MADELINOT WAR LORD that was locked in the ice 2.2 nautical miles away. The intent of the CCGS SIR WILLIAM ALEXANDER

was to head for clear water to the east before the impending weather change. Passing close to the MADELINOT WAR LORD to render escort and offering them an escape route, CCGS SIR WILLIAM ALEXANDER made a turn to the east to where open leads in the ice were known to exist. The MADELINOT WAR LORD quickly fell in aft, hugging the stern of L'ACADIEN II as close as possible, lest her way again be constrained by the ice floes. L'ACADIEN II had been advised that they would not be towed to home port, but rather to Sydney, the nearest port of refuge. MADELINOT WAR LORD, also damaged but manoeuvrable, indicated that she intended to make for home port independently once free of the ice.

On board the CCGS SIR WILLIAM ALEXANDER, a towing watch made up of two seamen on two-hour shifts was set. Their task was to watch the tow for any problems and keep the bridge advised on a working channel. The challenge of the tow was noted and their instructions were to cut the tow without hesitation or further instruction if, in their judgement, this was the correct action to ensure the safety of the towed vessel. An axe was placed at the towing fairlead for just this purpose. The Commanding Officer himself remained on the bridge, retaining command of the ship as always but also in control of the evolution, directly supervising events and keeping control of the ship's movements, including working the engine controls himself.

Progress through the ice was slow, with an average speed of some 2.6 knots, not much more than a brisk walking pace. CCGS SIR WILLIAM ALEXANDER was clearing a channel through the ice, a sliver of clear water forming directly astern of the Coast Guard vessel. With zones of pack and rafted ice on either side, ice would close in at varying rates astern of the two small vessels, depending on the pressures of the ice floes around them at any given juncture. The Bos'n and Chief Officer shared concern for the challenge of the tow. The master of the MADELINOT WAR LORD, observing from close astern, also felt reservations¹⁷. It was understood that the tow was more challenging and entailed more risk than an open water towing operation.



Figure 10: L'ACADIEN II's starboard fairlead and bitts

¹⁷ During an interview, the Master of the MADELINOT WAR LORD commented on his sense that the tow was risky and that he felt it verged on the edge of disaster on several occasions.

L'ACADIEN II took to cutting a series of yaws or S-curves from side to side, sometimes bouncing off the ice edge formed by the icebreaker's passage. Strain on the towline increased and eased without any distinct rhythm. Movement of the towed vessel was at times perceived to be particularly erratic by some of the observers¹⁸. The motion was occasionally causing the towing watch in CCGS SIR WILLIAM ALEXANDER such concern that they almost cut the tow, axe in hand, but then they would see things stabilize and relent. After a period of time the tow seemed to settle in¹⁹, notwithstanding the occasional irregular movements of the fishing vessel.

The perception of the tow from inside the L'ACADIEN II was less alarming²⁰. The yaw was not perceived as being severe, only some 3-5 meters off the baseline astern and limited by the ice. The crew had become accustomed to the effects of the ice during the early stages of the tow and the periodic rubs and knocks were not seen as problematic. The towing hawser was sometimes varying in slack and strain, and the bridles were occasionally catching in the anchor which was in its stowed position at the bullnose. Having settled into an acceptable pattern on the tow, the master of the L'ACADIEN II went to bed²¹ below, leaving two crewmembers on watch in the wheelhouse in compliance with the request of the Commanding Officer of the CCGS SIR WILLIAM ALEXANDER for someone to be on watch in the wheelhouse at all times. Of note, engine power, both ahead and astern, was used by the wheelhouse watch in L'ACADIEN II to ease strain on the hawser²² or to prevent closing the stern of the CCGS SIR WILLIAM

ALEXANDER too closely when a springing motion from the short tow caused the distance to close.

With CCGS SIR WILLIAM ALEXANDER making way towards the east and seeking open water, the towing evolution continued without significant episode for nearly two and a half hours. At about 00:30, the oncoming seamen's watch was awakened, arriving on deck for their turnover²³ at approximately 00:50. The state of the tow was discussed, as was the fact that the previous watch had nearly cut the towline. The position of the axe at the towing fairlead was confirmed, the radio was turned over and the watch assumed. The senior seaman chose to turn off the deck-head lighting with the aim of gaining a better level of night vision and perspective. The bridge was advised that the new watch was on deck.

4.6 THE CAPSIZE

A short period after the change of the towing watch, the small convoy of three vessels arrived at an open lead, a section of comparatively open water measurably different from that experienced during the previous 2½ hours of transit. CCGS SIR WILLIAM ALEXANDER no longer had to strain through pack ice²⁴. There was neither ice closing in astern of her nor a linear wall of broken ice constraining the L'ACADIEN II in the wake of the icebreaker. Maximum speed over the ground was achieved at this point, recorded as reaching 4.1 knots.

MADELINOT WAR LORD noted the L'ACADIEN II struck an ice cake the size of a small car at this juncture,

¹⁸ The towing watch on the afterdeck of the CCGS SIR WILLIAM ALEXANDER and observers in the MADELINOT WAR LORD offered a variety of descriptions of the progress of the tow. Essentially all spoke about occasions where L'ACADIEN II contacted the ice edge, meandered in the wake at least to some degree, and never fell into a movement that could be described as predictable.

¹⁹ Described by one witness as unpredictable but no longer alarming.

²⁰ Both survivors described their significant observations of the towing evolution as witnessed from the wheelhouse of the L'ACADIEN II. Both spoke about unpredictable yawing motions and contact with the ice edge astern of the icebreaker. Apart from the specific ice cake that caused the capsizing, neither felt a sense of alarm with the contact with ice or with the jostling that would result. They said that the previous week of working through the ice had left them accustomed to the rubs, movements and sounds of striking ice.

²¹ It was observed by one survivor that the master felt comfortable with the Coast Guard's presence and the initial stages of the tow. In commenting on the speed of the advance and the condition of the tow, he is quoted as saying "we won't break any eggs here".

²² Comments from the survivors of L'ACADIEN II suggest that the strain on the towline and the potential for it breaking, served as their main issue of concern, more than yawing or contact with ice, as the evolution continued.

²³ Proper procedure requires the off-going watch to brief the oncoming watch on equipment, responsibilities, orders and observations. Only when this is completed can the watch be relieved.

²⁴ Concentrations of ice through most of the towing evolution were reported at 8-9/10^{ths} of pack ice. The open lead was of sufficient scope to change at least some of the conditions affecting the tow.

rocked unstably for a moment and then fell back under tow with strain on the towline²⁵. Neither the stern watch in CCGS SIR WILLIAM ALEXANDER nor the survivors of the L'ACADIEN II recall this particular ice-caused motion, at least as remarkably as those who observed it from astern.

CCGS SIR WILLIAM ALEXANDER's speed over the ground decreased, eventually to 2.8 knots (5.18 km/h) at the critical moment of the accident. At this juncture almost all witnesses noted an angular movement by L'ACADIEN II to port. The perception of the severity and duration of the movement varies with each witness, but a clear movement of L'ACADIEN II to a position approaching the port the quarter of CCGS SIR WILLIAM ALEXANDER is consistent in testimony²⁶. Whether caused by a collision with ice, an unprompted application of engine thrust or some unintended application of port helm, or a combination of these effects, is unclear. What is evident is that L'ACADIEN II at least momentarily gained momentum sufficient to put slack in the towing hawser and give one witnesses in CCGS SIR WILLIAM ALEXANDER pause to consider if the towed vessel meant to overtake them²⁷.

Whatever the cause, L'ACADIEN II veered to port and took up a position off the stern of CCGS SIR WILLIAM ALEXANDER, displaced some 3-5 meters off the icebreaker's track. The bridge team had noted some occasional ice cakes off their track, but did not initially view them with concern as they appeared to be passing well clear of the hull. The after towing watch

also noted some occasional ice but were focused on L'ACADIEN II's movements and the oscillation of slack and strain on the towline. They suddenly, seconds before impact, realized the potential for the sealing vessel to strike a significant piece of ice, an ice cake that was some 10-15 meters across and sat with about 1 meter showing above the water.

In L'ACADIEN II, the surviving wheelhouse watch and perceived himself to be on the port quarter of CCGS SIR WILLIAM ALEXANDER for some time²⁸, becoming aware of the ice which now bore down on them when it was about half-way down the side of the CCGS SIR WILLIAM ALEXANDER. Unable to steer to starboard due to the steering casualty, feeling that steering to port would make things worse and that an astern movement might part the tow, they chose to put throttles to full ahead at the moment of impact in the hopes of smashing through the ice. They did not succeed and felt that L'ACADIEN II wedged herself against the ice,²⁹ became unstable as at least part of her keel sat against this comparatively solid mass, and was pulled by the strain on the towline onto her starboard side. As cargo shifted and with it the centre of gravity of the vessel, she was dragged laterally for some moments, soon taking on water through windows and the cabin door, and then almost immediately capsized, as her capacity to right herself disappeared³⁰.

On the bridge of the CCGS SIR WILLIAM ALEXANDER, the Commanding Officer was observing the L'ACADIEN II's movements from the starboard aft

²⁵ Only the master of the MADELINOT WAR LORD made a comment on this particular collision with ice, describing it precisely as "the size of a small car". Neither survivor remembers seeing nor contacting such an ice cake in the minutes prior to striking the ice which caused the capsizing. In CCGS SIR WILLIAM ALEXANDER, neither bridge personnel, two of whom were likely positioned on the starboard side at this juncture, nor the two lookouts of the towing watch noticed this ice collision.

²⁶ Only one observer did not perceive a movement of the L'ACADIEN II at least to some degree to port. Amongst the other observers, including the survivor positioned in the wheelhouse of L'ACADIEN II, there is variance in their descriptions of speed of movement, strain on the towline, and distance off the baseline position directly astern of the icebreaker.

²⁷ The perspectives of each witness varied, often affected by their placement and point of view. One observer, a member of the lookout watch on the afterdeck of the CCGS SIR WILLIAM ALEXANDER, distinctly noted slack in the towing hawser, movement to the port quarter and a reduction of the distance between the two vessels.

²⁸ The wheelhouse survivor from L'ACADIEN II described a much less sudden movement to port than observed by the Coast Guard witnesses, though he perceived remaining on the port quarter for some time, noting that from their position aft he could see almost the whole of the port side of the icebreaker.

²⁹ External observers almost unanimously perceived that the L'ACADIEN II mounted the ice cake to some degree. Internally, the wheelhouse survivor is insistent that they did not ride up on the ice but, rather, they planted the bow with the stern rising up before rolling over. This latter image is akin to a slow-moving bicycle hitting the sidewalk, the back wheel lifting before falling over.

³⁰ A vessel is designed to survive the motion of the sea and to return to the upright position by default. The stability curves for L'ACADIEN II corroborate the fact that her design was inherently stable, though as in all vessels there was a natural 'point-of-no-return' in her design curves. Having gone beyond this point, due to the leverage of the ice and the pull of the towline, L'ACADIEN II was unable to return to the upright position and capsized. This is more fully covered in the analysis.

bridge window³¹ and moved quickly to the port wing to observe the result of the sheer. Upon arriving on the port side seconds later, he immediately noticed that L'ACADIEN II had taken a larger sheer than normal and seemed to hold for some moments a position comparatively broad on the quarter, despite there being strain on the towing hawser as well as on the port leg of the bridle³². A sizable ice cake suddenly caught his eye and fell astern to strike the L'ACADIEN II. As this was happening, he ordered full astern on the engine throttles and ordered his towing sentries astern to cut the tow on VHF Channel 19, the internal working frequency.

On the afterdeck of the CCGS SIR WILLIAM ALEXANDER, the watch saw L'ACADIEN II strike and climb onto the ice, witnessed the initial lateral pull and saw strain coming on the tow-line. As in L'ACADIEN II, the initial concern was that the towline would part, not the possibility of capsize³³. A call to the bridge was made to inform them of the strain and to advise them to stop. As the call was being made, they witnessed L'ACADIEN II fall over onto her side. As this was happening, a seaman took the axe and cut the towline. He parted the tow line with one blow but it was too late to prevent the capsize of the vessel as the L'ACADIEN II had almost immediately rolled to starboard into clear water and capsized.

As the astern power of the CCGS SIR WILLIAM ALEXANDER took hold, the ship lost way³⁴ and her stern began a swing to port. When the bridge crew shifted to the starboard wing to keep sight of the tow, they first realized that the vessel had capsized.

4.7 THE RESCUE EFFORT

The crew of the MADELINOT WAR LORD made frantic calls on VHF Channels 6 and 16 to advise of the turn of events with L'ACADIEN II. Witnessing the capsize from a position just metres away, the MADELINOT WAR LORD immediately approached the hull to search for the crew.

In CCGS SIR WILLIAM ALEXANDER, the bridge crew heard the radio calls advising them of what they had just witnessed. With only the Commanding Officer and the Watch Officer to manage the many aspects of the emergency, they chose not to immediately respond to the call and prioritized their actions. They focussed at this stage on a man overboard recovery operation and raised the general alarm, manoeuvring the ship and preparing to launch the Fast Rescue Craft (FRC). In turn, they advised Coast Guard Radio and JRCC of the accident. Assistance, particularly a dive capability³⁵, was requested.

MADÉLINOT WAR LORD caught sight of one survivor and immediately approached to effect recovery. With one survivor on board, a second crew member was sighted on the opposite side of the capsized hull, prone on the ice. MADELINOT WAR LORD again manoeuvred for recovery. The CCGS SIR WILLIAM ALEXANDER's FRC was ready for launch seven minutes after the internal alarm was sounded. It was launched and was underway some four minutes later. It was dispatched to assist in the rescue with the Chief Officer aboard to assess the situation. Ice conditions began to change, though whether wind, current or ice pressure was the cause is uncertain.

³¹ High in the ship and surrounded by windows, the bridge gives a good vantage point for its occupants to observe events around them. One exception is the area directly astern of the vessel which is obscured by the ship's superstructure. The port and starboard after windows, and the external bridge wings, or walkways, give the best, if compromised, visibility when looking aft. Often, only the stabilizers and masthead would be visible from the bridge.

³² The perception from the port bridge wing was that L'ACADIEN II sat momentarily on the port quarter, perhaps 45 or as much as 60 degrees off a baseline directly astern. With strain on the port leg of the towing bridle, L'ACADIEN II should have immediately started moving back to the centreline, a position more directly astern of the icebreaker.

³³ Interviews with both towing watches confirm that the parting of the towline was the biggest concern. At the time of the accident, the seaman charged with cutting the towline perceived the issue of strain on the line and the potential parting of the tow as his first concern.

³⁴ The momentum of the icebreaker continued to drive her forward even with astern power engaged, likely allowing the vessel to move some 60 to 100 meters from where astern power was initially applied. At a certain point, located on the starboard bridge wing, with headway gone and a swing of the ship's head to starboard initiated, the Commanding Officer stopped engines and assessed his next actions.

³⁵ Coast Guard ships do not have SCUBA diver capability. Only the navy retains such skills at sea and only in their larger vessels. With a capsized vessel, the Commanding Officer of CCGS SIR WILLIAM ALEXANDER saw the importance of diving capability in aiding the rescue effort. Of note, however, is the fact that this effort would require the skills of 'penetration diving', the specialized and rare capability to enter a submerged hull. Only the divers of the military's SAR Squadrons have this skill within government assets

As CCGS SIR WILLIAM ALEXANDER manoeuvred in an attempt to fend off the closing ice floe and keep open water around the scene, her three powerful fixed flood-lights astern³⁶ swung around leaving the accident scene unlit for some moments, until the search lights fitted on top of the wheelhouse came into play. An anxious search for more survivors was engaged in by both MADELINOT WAR LORD and the FRC as ice conditions worsened, constraining the movement of the smaller vessels. Sounds were heard coming from the hull and hope arose that this was the signal of survivors. With no other crew members visible, priority shifted to securing the hull in the hopes of preventing it from sinking and allowing access to any crew who might be trapped aboard. The FRC was brought back alongside to load securing strops for use with the foredeck buoy crane aboard the CCGS SIR WILLIAM ALEXANDER.

4.8 SECURING L'ACADIEN II AND CONSIDERING CUTTING INTO THE HULL

The FRC of the CCGS SIR WILLIAM ALEXANDER made its way back to the overturned hull and joined the crew of the MADELINOT WAR LORD in rigging strops in the hopes of securing the hull and preventing her from sinking, possibly with trapped survivors on board. Meanwhile, with rafted ice again constraining movement, the CCGS SIR WILLIAM ALEXANDER made her way carefully³⁷ towards the accident site. Concerns regarding a collision with the L'ACADIEN II or the vessels tending her, injuring their crews, or of crushing an unseen survivor on the ice weighed heavily on the bridge team. The goal was to close as rapidly as safety allowed, stabilize the L'ACADIEN II and assess the options for searching for potential survivors. With the overturned condition of the hull and the salvage gear available, it was believed that the options were limited.



Figure 11: Portable gas saw from CCGS SIR WILLIAM ALEXANDER, with blade removed

Almost an hour after the accident, the CCGS SIR WILLIAM ALEXANDER was alongside the pair of sealing vessels, securing the overturned hull of the L'ACADIEN II with the assistance of the MADELINOT WAS LORD, balancing the strain on strops placed fore and aft and in turn, taking up the load with her buoy crane. The weight of the vessel was greater than the working capacity of the crane and a minor list quickly developed.

Consideration was given to cutting a hole in the hull, but the risks were deemed too high that this could release the remaining air pocket out and cause the hull and missing crew to sink. When word was received of a delay in the arrival of the divers, it was decided that the limited time remaining for any of the missing to survive the conditions outweighed the potential risks. Working in the dark on the bobbing hull and using a 12" circular saw, a Coast Guard seaman worked to cut the hull at a spot below the engine compartment of the L'ACADIEN II, as advised by one of the survivors. The site of the cut was accurate, but the hull frames were numerous and deeper than the saw's blade, making progress slow.

³⁶ See Figure 16.

³⁷ This phase of the rescue was described in some detail by the Commanding Officer and the First Officer who described the challenge of balancing the desire to immediately return to the scene of the accident with ensuring the safety of the rescue workers and the potential survivors. With the return of the ice and the imprecise movements of a vessel as large as the icebreaker, a real risk of collision in close quarters existed as well as the possibility of overrunning a survivor on the ice.

One of the survivors from L'ACADIEN II was able to look into the space. An air pocket was present, but no crewmen of the L'ACADIEN II were found. Unable to make their way into the hull, a foam patch was set to help retain the air pocket and keep the hull afloat.

4.9 THE DIVE TEAMS AND RECOVERY OF CASUALTIES

Given the unsuccessful attempt to penetrate the hull, the rescuers were forced to wait for the arrival of the Search and Rescue technicians and their penetration dive capabilities. Attempts by JRCC and the Coast Guard Radio Station staff to locate civilian dive teams had failed to locate assets in Cape Breton with the skills or mobility to arrive on-scene³⁸. The focus for this capability was placed on the Department of National Defence and the Search And Rescue (SAR) Squadron at CFB GREENWOOD in Nova Scotia.



Figure 12: Securing L'ACADIEN II alongside CCGS SIR WILLIAM ALEXANDER

Unfortunately an equipment malfunction, related to a failure of vital communications equipment delayed their departure. Two teams of two divers were eventually dispatched and began arriving on scene, the first pair being hoisted down with their equipment from a CORMORANT helicopter to the flight deck of the CCGS SIR WILLIAM ALEXANDER at approximately 06:00. Quickly assessing the scene and determining the possibility, though remote³⁹, of survivors in the hull, the second pair of divers circling overhead in a fixed-wing HERCULES aircraft were called in and arrived with their gear by parachute drop onto the ice and in the water.

With the assistance of the MADELINOT WAR LORD⁴⁰, dive gear and SAR Techs were recovered and united into a four-person dive team and a plan for the dive set in place. Diving in vinyl dry-suits with CABA breathing apparatus and equipped with an extensive tool-kit, including extra air cylinders, a sequence of four dives, each of 10-20 minutes duration, was set into motion.

The first diver recovered two bodies from the wheelhouse. The second diver secured gear in both the wheelhouse and the berthing compartment to minimize the possibility of entanglement and to assist in the search. The third diver discovered a third victim in the berthing compartment and effected the extraction. Both the exterior and interior of the vessel were scoured for potential survivors, as well as for the bodies.

On the fourth dive, while again investigating the internal spaces of L'ACADIEN II, it was apparent that even the slightest movement of the vessel was allowing equipment to shift within the inner spaces, increasing the potential for diver entrapment. This factor, along with the debilitating effects of

³⁸ The winter season is the off-season for most commercial dive companies as well as the majority of civilian dive clubs. Although some fire departments have dive capability this is mostly used for evidence recovery, not wreck penetration. The unique nature of the dive skill required and the urgency of bringing people together meant that only the SAR Technicians had the skills and mobility to respond.

³⁹ The SAR community uses tables which describe the likely survival times for mariners immersed in water. The tables take into account a range of factors including individual fitness, age weight, clothing, use of a flotation device, the water temperature and whether the individual is fully or partially immersed. The conditions at hand did not offer an optimistic scenario because so much time had passed. Because the rescuers reported hearing knocking coming from the hull, the divers concluded that this faint hope required that they attempt a penetration of the capsized vessel.

⁴⁰ Assigned to assist in gathering the diving equipment dropped by parachute from the SAR HERCULES aircraft, the master and crew of the MADELINOT WAR LORD responded with skill and energy, ensuring that they arrived immediately at every drop site and avoided any loss of equipment on the ice or in the water. Similarly, they quickly recovered the two divers after their parachute drop, in one case removing a diver from an ice cake and, in another, precluding a diver from having to remain too long immersed in water after landing in an open lead. It should be noted that, in Canada at least, this is the first recorded SAR parachute-drop onto winter sea ice.

hypothermia⁴¹ being felt by all four divers as a result of the extreme conditions of the dive operation, determined that they would not attempt to conduct a second round of dives as the risk had become too great and it was clear that they were no longer on a search for survivors⁴². The missing crewman had not been found within the hull and was not readily visible either in the rigging or under the ice. It was concluded that he had been lost at sea.

4.10 REPATRIATION OF SURVIVORS AND INITIATING SEARCH REDUCTION

With search and recovery operations completed, focus turned to the transportation of the survivors and the bodies of the three victims. The two survivors had asked to meet the Commanding Officer and were brought to the bridge of the CCGS SIR WILLIAM ALEXANDER to express the desire to be transported to the Magdalen Islands as soon as possible to be reunited with their families. Arrangements were made through the JRCC and the Coast Guard ROC and a Coast Guard helicopter was dispatched, arriving on board late in the morning of the 29th and flew the two survivors to the Islands.

Concurrent with this activity, JRCC and the SAR Commander in Halifax were faced with considerations of scaling down the search for the missing crewman. Much air activity had been conducted in the area as well as the search by the SAR Techs. All hope of locating the crewman alive had passed and the core role of the available SAR assets had to be respected by prioritizing their employment for search and recovery of the living⁴³. A determination was made to reduce the search effort and pass the file on to the RCMP as missing person's case, the normal process in such

circumstances. The JRCC case officer undertook to advise the families of this decision and the operational imperatives at play. Unfortunately for the family of the missing man, an intermediary agent failed to relay the decision and the family only learned of the change through the news media.

4.11 RELEASING THE HULK

Approaching mid-morning of 29 March, CCGS SIR WILLIAM ALEXANDER remained beside the overturned hull of L'ACADIEN II, strops attached, holding a 2-2½ degree list and maintaining a tenuous attachment to a weight well beyond the safe operating limit of the crane. When the SAR case was terminated as confirmed by the completion of the dives, a series of events occurred which lowered the case file in terms of priority as compared to other cases ongoing in the area. These included vessels taking on water. An air sector search⁴⁴ for the missing crewmember was conducted by a second CORMORANT helicopter from Gander, but the assignment of SAR units was reduced with time.

MADELINOT WAR LORD indicated a desire to make for home, as well as an expectation that CCGS SIR WILLIAM ALEXANDER would provide her escort. The need to transport the remains of the three victims arose as the key factor in determining the CCGS SIR WILLIAM ALEXANDER's next course of action. Acknowledging that CCGS SIR WILLIAM ALEXANDER was unable to either salvage or tow the overturned and now abandoned vessel, and cognizant of the other priorities at hand, consultations with the JRCC in Halifax, the ROC in Dartmouth, the Transportation Safety Board and Transport Canada allowed management to determine that the L'ACADIEN II should be set adrift with a transponder left at the location. It was deployed primarily to track the drift of the hull in the hopes of assisting in the recovery

⁴¹ These were extreme conditions for a diving rescue. Both the environmental conditions and the technical aspects of the work were on the edge of the safety envelope. The dive suits and thin thermal underwear employed that day offered only limited thermal protection from the frigid water. All four divers showed symptoms of hyperthermia, including violent shivers, muscle pain, cramps and loss of muscle control. Numbness to the hands, and indeed loss of hand control and movement, represented a significant potential danger in the cramped quarters of a penetration dive.

⁴² SAR policy states that SAR Techs will only risk their lives for the living, or for the injured still thought to be alive. Once the first round of dives was completed, the situation and the risk to the divers had to be considered, resulting in a decision to cease diving operations.

⁴³ The SAR Commander, the navy Rear Admiral based in Halifax, is required to manage his available assets carefully given the size of his area of responsibility, ranging from the Arctic to Nova Scotia and out to the central Atlantic. Using SAR policy as a guide, and with the advice of his SAR specialists, he determines when a search effort is reduced and ceased.

⁴⁴ Sector searches are areas searched by aircraft or ships, whether with radar or other electronic sensors or with a visual lookout. Conditions of wind and sea will determine the type of search pattern, as will the mobility of the person or item being sought. In the case of the missing crewman from L'ACADEIN II, the search pattern was localized to take account of wind and current.

of the missing crewmember and would also provide information to authorities ashore about what had now become a potential danger to navigation. CCGS SIR WILLIAM ALEXANDER let loose the strops at 08:48, withdrew from her position alongside L'ACADIEN II and stood off observing the stern section of L'ACADIEN II and looking for the missing person for the remainder of the day while awaiting instructions.

With slightly improving ice conditions, MADELINOT WAR LORD began her transit to home port independently at about 09:30, eventually joining company with another sealing vessel. Later that day, at approximately 17:02, after being released from the L'ACADIEN II case by JRCC, CCGS SIR WILLIAM ALEXANDER contacted MADELINOT WAR LORD to ascertain if further assistance was required. The offer was declined. Advising JRCC of the circumstances on scene, CCGS SIR WILLIAM ALEXANDER was released from the MADELINOT WAR LORD case at 17:12. CCGS SIR WILLIAM ALEXANDER then made her way to Sydney Harbour to deliver the remains of the victims. A transponder buoy was placed on the ice before departing as instructed by the JRCC, but the signal did

not activate. As the signal is only received at specialized antenna locations ashore, the CCGS SIR WILLIAM ALEXANDER was only made aware of the malfunction some time later when alongside in Sydney.

4.12 REPATRIATION OF THE DECEASED

It was initially felt that the remains of the three victims, which had been gathered on board the CCGS SIR WILLIAM ALEXANDER, would also be transported directly to the Magdalen Islands. Subsequently, it was realized that the location of the accident off the coast of Cape Breton gave jurisdiction of the required medical examination to Nova Scotia. The bodies were transferred to the Medical Examiner of Nova Scotia with the ship's return to Sydney Harbour, via the RCMP who serve as the Medical Examiner's agents in such circumstances. Several days later, with the medical examination completed, arrangements were made to repatriate the remains to Cap Aux Meules for commemorative services and burial.

4.13 ISSUES IN THE AFTERMATH

With the malfunction of the tracking buoy and consideration of the potential value of recovering the hull to assist in the investigation, a number of Government air assets and Coast Guard vessels were assigned to search for the remains of the missing seaman and the vessel. The option to salvage remained a possibility. The hull was located on at least two occasions within significant surface ice and with only the after end remaining visible above the ice. Before salvage assets could be set into motion the air pockets presumably diminished and the vessel sank. It is possible that the L'ACADIEN II sat semi-buoyant in the water column^{45a} and traveled on the currents for some time afterwards. On 17 July, debris from the L'ACADIEN II was found in St-Esprit area, south west of Fourchu, Cape Breton. Including the fibreglass 4-person life pod, immersion suits and a life ring, the discovery was unquestionably of material from the sealing vessel, though the hull itself has not been located.



Figure 13: View of L'ACADIEN II from CCGS SIR WILLIAM ALEXANDER on 29 March 2008

^{45a} It is possible that the hull of the L'ACADIEN II slowly released the air pockets trapped in the hull, meaning it did not sink to the ocean floor immediately after slipping beneath the surface ice cover. Semi-buoyant and semi-submerged, the vessel could have been carried on the currents for some time, likely moving in a south or southeasterly direction, a theory borne out by the recovery of some of its wreckage along the east coast of Nova Scotia.

CHAPTER 5 – ANALYSIS

The analysis effort of this investigation has included an extensive review of documents, reports, testimony, and live demonstrations. The goal throughout was to understand the incident as fully as possible so as to deliver pertinent advice and recommendations to avoid such an incident in the future and to improve the conduct of Coast Guard operations in general.

The library of knowledge and experience that is represented by the reference material and expert opinion sought and engaged by the investigation team is immense, much of it listed in Annex B. In considering this body of knowledge along with the factors of the case, and in revisiting the Terms of Reference, it became apparent that two domains existed which required a degree of precise assessment in this report; the analysis of the events, actions and decisions leading up to, during and in the aftermath of the accident; and, systemic factors. The effort to assess if the conduct of the operation fell within the parameters of *the good practices of seamen*, even if risks were undertaken, was key to understanding the event and to allowing conclusions from which meaningful recommendations have been derived.

Commentary on this analysis of the incident is delivered below. To avoid repetition, narration of the events is limited in this analysis section, thus reference to the Chronology of Events above may be useful. The Analysis of the Accident is then followed by the section Assessing Systemic Factors which remarks on the larger scale of systemic factors which influenced the accident.

5.1 ANALYSIS OF THE ACCIDENT - EVENTS, ACTIONS AND DECISIONS LEADING UP TO, DURING AND IN THE AFTERMATH OF THE ACCIDENT

The conduct of towing at sea is a complex activity with many inherent yet often acceptable risks. The

acceptability is framed by the willingness or need of the towed vessel to give up much of the control over a vessel's movements and the willingness of the towing vessel to take on the levels of responsibility embodied in the operation. Though there is a shift in decision-making responsibility and indeed power, the shift is never fully 100% and the evolution is, when both vessels remain manned, always one of a shared interest. What follows below is an analysis of many of the sub-elements of the course of events on the night of 28/29 March which assesses issues, considerations and decisions. These analytical observations and conclusions consider the full range of commentary from witnesses, experts and the reference material.

ASSIGNMENT OF CCGS SIR WILLIAM ALEXANDER

The tasking of the CCGS SIR WILLIAM ALEXANDER by the JRCC at 18:59 was the culmination of an afternoon of work by the Rescue Centre's operators, taking in a number of reports and assessments through conversations with radio stations, Ice Offices and the ROCs in Quebec City and Dartmouth. A number of cases of a variety of types existed. Some were elevated to a place on the JRCC case file without representing actual distress situations, such as the L'ACADIEN II and her mechanical difficulties. Some, such as the MADELINOT WAR LORD and the fact that she had been taking on water, were seen as more urgent but again did not represent an immediate distress situation. In combination with the weather forecast advising of a potential gale, the gut feel in the JRCC⁴⁶ was that if there were no distress situations in progress at the moment, there was a distinct likelihood that some would develop overnight. Discussions with the ROC in Dartmouth confirmed this perspective and the decision was made to activate CCGS SIR WILLIAM ALEXANDER, already assigned to SAR response, and move the ship to an area to deal with the dynamic and growing issues of concern occurring in Sydney Bight. The tasking,

⁴⁶ As described in interviews with a number of JRCC personnel, there was a great volume of information but it lacked clarity and precision. Tapping into a range of sources, the JRCC Watches were putting together a puzzle. A key element was the weather forecast describing the potential of a gale and the sense that this might have significant consequences for the vessels trapped in the ice. This made the presence of a primary SAR asset an imperative for the JRCC staff, resulting in the dispatch of CCGS SIR WILLIAM ALEXANDER from Sydney Harbour.

delivered to the Officer of the Watch, spoke of the need for a tow and the alternate possibility of removing the crew⁴⁷.

MADÉLINOT WAR LORD was initially perceived as the vessel of priority as the CCGS SIR WILLIAM ALEXANDER left Sydney Harbour. It was at 21:30, as the details of the situation at sea became more evident, that the JRCC chose to prioritize the L'ACADIEN II and tasked the CCGS SIR WILLIAM ALEXANDER to tow the vessel clear of a lee shore. The conversation between JRCC and the Commanding Officer of CCGS SIR WILLIAM ALEXANDER is fairly succinct on this matter. The issue of the damaged steering, the aspect of the nearest port of repair and the primary language of the master of the L'ACADIEN II were all discussed.

It should be noted that the more common task assignment is to 'render assistance' as opposed to the more definitive task to tow, though this latter approach is not rare. The task to tow would serve to form the lens through which the Commanding Officer of the CCGS SIR WILLIAM ALEXANDER would form his assessment and plan. Though the Commanding Officer, the one on-scene, always has the authority to refuse the tasking, there is a natural reluctance to do so unless factors at sea clearly dictate otherwise.

DECISION TO TOW

Leaving aside all factors related to distress, a forecast gale, potential groundings or ice damage, the fundamental situation for L'ACADIEN II was that the vessel was, by definition, restricted in her ability to manoeuvre (RAM). The vessel's master had declared himself damaged, *'pas maitre de sa manoeuvre'*⁴⁸,

though he only ever requested an ice escort through his conversations with Coast Guard Radio while the actual need was for a tow⁴⁹. The damage to L'ACADIEN II's rudder meant the vessel would require a tow, ice or no ice. No commercial enterprise was found to effect the tow, nor was it safe to request another sealer⁵⁰ to assist given the conditions of the ice and the many problems the boats in the area were already experiencing.

In assessing the sequence of events in the context of policy again, it can be stated that an effort to raise other fishing vessels to assist was not attempted nor was there time taken to seek commercial towing service to take up the work. On the first point, it is clear that the ice conditions and the number of vessels already in trouble in the area suggested that this option was untenable. The Commanding Officer already had one disabled vessel on a lee shore and had no intention of asking another vessel to move in closer to the coast; either to put itself at risk or to give himself a more complex problem should it too become disabled. As to a possible commercial tug, the speed/time/distance factors⁵¹ made a request at this juncture uncertain given the forecast. It would have been an option shore authorities had explored more fully than could ever be done from sea. Further investigation into this issue in the aftermath of the incident confirmed that commercial resources of sufficient capability are not resident in the area during the ice season.

On the night of 28 March, the decision to tow was based first and foremost on the request by the L'ACADIEN II for assistance in clearing the coast given a concern for being run aground or, more likely, crushed

⁴⁷ Electronic transcripts describe a pair of conversations between the JRCC and the CCGS SIR WILLIAM ALEXANDER. Each concludes with an understanding of the need to tow the L'ACADIEN II.

⁴⁸ Literally, *not master of his movements*, or RAM in a legal sense.

⁴⁹ Though seemingly semantics, the terms and definitions mattered, particularly while shore agencies were still attempting to develop a complete understanding of what was taking place on the ice. The request for a tow would have highlighted the damage to the L'ACADIEN II, thus likely giving rise to a non-distress SAR incident, which is in fact what the L'ACADIEN II case eventually became. The response to a request for escort was not within the JRCC's area of responsibility, but was instead referred to the Dartmouth Ice Office where the case fell into a completely different set of priorities, at least until a better understanding of L'ACADIEN II's circumstances emerged.

⁵⁰ This perspective was held by JRCC, the staff of Sydney Coast Guard Radio and the Commanding Officer of the CCGS SIR WILLIAM ALEXANDER. The unanimous impression was that there were enough vessels in trouble and requesting the assistance of another undamaged sealer would only increase the level of risk.

⁵¹ In essence, the time to contact, hire and deliver a tug to the scene, if one was available, was beyond the time available with the current weather forecast. It was assessed that commercial assets would arrive too late.

in the growing ice pressure borne by a strong onshore wind and set. This perspective was reinforced by the fact that JRCC had in fact tasked CCGS SIR WILLIAM ALEXANDER to tow the vessel as opposed to rendering a broader assignment to merely provide assistance. The JRCC's concern for potential issues in the ice was validated by the evening forecast received aboard the CCGS SIR WILLIAM ALEXANDER, and shared by the Commanding Officer. Though not keen on the prospects of a tow⁵², if the icebreaker did not act now to extricate the L'ACADIEN II the Commanding Officer could find himself forced to act in several hours as a result of the weather, and in deteriorating conditions. The option of abandoning the vessel was not considered in depth and was seen as an extreme course of action in the circumstances⁵³. Considering the weather forecast, the risks and the Commanding Officer's experience in towing in ice previously, taking up the tow fell within the spectrum of assistance described by Coast Guard policy, aligned with the task from JRCC and was a reasonable if risky approach to circumstances which presented risks in every option available.

LEAVING THE CREW OF L'ACADIEN II ON BOARD

Hindsight brings particular scrutiny to the decision to leave the crew aboard the vessel during the tow and for the majority of the crew to be sleeping in the accommodation space. There are a variety of perspectives in the references and according to subject matter experts. The environmental conditions and the size of the vessel towed are key aspects in determining a course of action. A number of case studies demonstrate the vulnerabilities of manning a towed vessel, though sometimes without a final determination of the best approach. One Coast Guard publication suggests "the crew of the stricken vessel should be evacuated only when staying aboard could

compromise the safety and well-being of the crew."⁵⁴ On the night of the accident, the perspective of evacuating the crew was balanced with concerns for endangering crewmembers in the transfer across the ice or accidents should the decision somehow limit the reaction to problems with the tow or other aspects of the safety of the L'ACADIEN II.

Several elements are key in considering this issue. First is that of culture. A master is naturally reticent to zero-man his vessel, even in risky conditions, if not because of them. Similarly, he is disinclined to break up his team without strong justification. Masters, in this case the Commanding Officer of CCGS SIR WILLIAM ALEXANDER, are also reticent to dictate to other commanding officers how to do their business, such is the respect held for the ultimate authority of a commander at sea, even in this modern age.

A second condition is that risks at play on the ice at the time the tow was taken up on 28 March. As can be seen in Figure 14 below, the darkness of the middle of the night in pack ice may not be the time to be asking tired crewmembers to transfer from one vessel to another. The factors of fatigue, the limitations of spotlights and the dangers of the pack ice, including the very real risk of someone falling through the ice, made this a risky proposition.

We know that CCGS DES GROSEILLIERS had effected a transfer of her two engineers by crane earlier in the day and SAR Techs were later transferred from one vessel to another by the sealing ramp. This was done in daylight and without the sense of urgency imposed by the forecast and the requirement that several vessels had to be reached through the night. In this light, it was reasonable to leave the crew of the L'ACADIEN II on board their vessel.

⁵² In describing the decision to tow, the Commanding Officer of CCGS SIR WILLIAM ALEXANDER referenced the instructions he had taken from JRCC, the reticence he had with regards to the tow and the risks it represented. Previous experience towing in ice gave him the sense that he could mitigate the risks, bringing him to conclude that a tow could be undertaken.

⁵³ The L'ACADIEN II and the crew of the sealer were not in immediate danger. There was no imminent danger to demand the abandonment of the vessel. The potential for successfully towing the sealer free of the ice seemed to argue against the need. The issue of minimum manning or an unmanned tow was never discussed during the radio conversations between the two vessels. Neither the Commanding Officer of CCGS SIR WILLIAM ALEXANDER nor the master of the L'ACADIEN II raised the issue.

⁵⁴ Department of Fisheries and Oceans/Canadian Coast Guard Towing Policy and Procedures.



Figure 14: Example of Night-time Conditions on the Ice

What remains however is the question of how well the masters and crews understood the risk scenario they were facing. Both survivors described a sense of relief on board felt with the arrival of the icebreaker⁵⁵. Neither sensed significant concern over the initial stages of the towing evolution nor had perceived misgivings with the relative scale of the two vessels. The decision on board L'ACADIEN II to allow four of the crew to be asleep in the accommodation below does suggest that the potential for a sudden incident was not well recognized. The Commanding Officer of the CCGS SIR WILLIAM ALEXANDER was not aware of the location of the L'ACADIEN II's crew nor had there been a conversation directing or advising against being asleep below-decks. A more complete conversation about the tow and the risk to consider may well have delivered a different scenario altogether.

With the benefit of hindsight, we can dispassionately assess the risks involved, particularly in towing a

vessel of such relative dimensions. In such cases the default decision should now be to require minimum or zero manning in the stricken vessel, assuming conditions allow transfer of the remaining crew, and that those aboard should be alert and prepared to evacuate should the situation require.

TYPE AND LENGTH OF TOW

In consultation with a commercial towing company, it was concluded that the best approach for dealing with the L'ACADIEN II's steering failure and the risks facing the two vessels would be to hoist the stricken vessel clear of the water by crane and transport her clear of the ice. Risky in its own right, generally unaffordable by a small fishing or sealing enterprise, this technique was beyond the capabilities of the CCGS SIR WILLIAM ALEXANDER and her equipment.

The Commanding Officer and Chief Officer of the CCGS SIR WILLIAM ALEXANDER assessed the conditions at hand and the means available for bringing the L'ACADIEN II to open water at least, and if necessary to the nearest accessible port of repair⁵⁶. It was decided to rig a tow-line from the afterdeck⁵⁷ utilizing a 1½ inch diameter hawser of double-braided synthetic nylon construction similar to a Samson Braid. To restrict the movement and yaw of the towed vessel, seeking to keep it snug astern and to avoid wide movements and excessive contact with the ice, a bridle was utilized. Common practice and well described in a variety of references, the bridle is designed to impart corrective strain on the towed vessel, imparting a correcting movement as soon as a yaw is felt, thus keeping the towed vessel as near to the centre-line of the intended track as possible⁵⁸. The effectiveness of this technique was borne out again and again in a range of towing trials which were performed to aid this investigative report.

⁵⁵ The survivors spoke of their own sense of relief with the arrival of the "red hull", the Coast Guard icebreaker. As well, they described the master of the L'ACADIEN II as being relieved at its arrival.

⁵⁶ In accordance with Coast Guard policy, a disabled vessel such as L'ACADIEN II could not be guaranteed a return transit to home port. In the situation of 28 March, CCGS SIR WILLIAM ALEXANDER was assigned as the primary SAR asset to the east side of Nova Scotia, precluding movement to the Gulf of St. Lawrence or to Newfoundland waters.

⁵⁷ Refer to the diagram at Figure 16.

⁵⁸ A witness from L'ACADIEN II described the yaw through the early part of the towing evolution as being in the order of 3 meters either side of a line directly astern of the CCGS SIR WILLIAM ALEXANDER, no more.

Because of the pack ice and concerns for ice under pressure to close in rapidly astern of the advancing CCGS SIR WILLIAM ALEXANDER⁵⁹, it was determined that the length of the tow should be the minimum possible while seeking to mitigate for excessive strain on the line, the possibility of the towed vessel overtaking and striking the CCGS SIR WILLIAM ALEXANDER and, perhaps most importantly, precluding vertical strain on the fairleads and bits on board the L'ACADIEN II, lest they be forced to work beyond their design specifications and fail catastrophically⁶⁰. A short tow was planned for and a tow length of approximately 27 m⁶¹ was chosen as the two vessels got underway and the tow settled in. After accounting for such factors as vertical separation, the bridle being partly used to take turns in securing it to the bits aboard L'ACADIEN II and the element of stretch in such line, a stern to bow distance between the two vessels was calculated to range between 22-25 m.

Though towing theory for Arctic operations favours a towed vessel being "snugged up" into what is described as a V-stern⁶², sometimes found in specialized towing vessels purpose-built for Arctic operations, the hull configuration of the CCGS SIR WILLIAM ALEXANDER precluded this approach. Given the two vessels in question and the equipment available, both the length of tow and the use of a bridle in the arrangement were appropriate to the circumstances. The size of the towing hawser itself was not ideal in that it was very nearly impossible that it would part under strain, given the light displacement of the towed vessel. While normally a positive attribute, this disinclination to part, along with the fact that no breakable links, tension meter or manual quick-release mechanisms existed in the

towing rig, meant that the singular means of parting the tow in extreme circumstances and under strain was the use of an axe on the afterdeck. While the towing arrangements themselves were satisfactory and in accordance with Coast Guard policies, this single point of control would become of paramount importance at a key point in the evolution.

SPEED AND DIRECTION

A key factor in the conduct of the tow and the mitigation of the risks at play resided in the choice of speed for the transit. Recorded data from the CCGS SIR WILLIAM ALEXANDER's navigation systems were available which delivered readings based on satellite-based Global Positioning System information⁶³. Records inform us of a range of speed, spanning from the commencement of the tow through to the accident, of 2.5 to a maximum of 4.1 knots (roughly 2.87 MPH/4.62 km/h through to 4.71 MPH/ 7.58 km/h). These speeds are from the raw data and are corroborated by and coincident with the observations and testimony of witnesses. It must also be noted that these satellite readings represent speed over the ground and not through the water⁶⁴. With an easterly current of 1 knot on average around the time of the incident, speed through the water, and relative to a stationary object such as ice, which is flowing with the current, was 1 knot less than indicated.

The speed recorded by CCGS SIR WILLIAM ALEXANDER at the time of the accident was 2.8 knots over ground (3.22 MPH / 5.18 km/h, and 1.8 knots through the water – a walking pace), decelerating in advance of the incident from the maximum of 4.1 knots somewhere in the minutes prior. There clearly followed a rapid and marked deceleration in

⁵⁹ Ice under pressure, whether caused by wind or current, will generally seek to close in over any open water.

⁶⁰ Reference to the image at Figure 10 is useful. The fairleads and bits are designed for horizontal forces and have limited strength when subjected to vertical or upward pull. When taken beyond their design strength, they can fail catastrophically and be torn from the hull, presenting extreme danger to anyone in the vicinity or in line with the movement.

⁶¹ Measured by comparing the figures of the towing gear certificate provided by the manufacturer with the line remaining after the towing hawser was cut at the scene of the accident.

⁶² The V-stern is a unique design specifically for towing in the conditions of Arctic ice. The after end of the tug or towing ship has a V-notch constructed into the stern. The towed vessel is secured tight, or 'snugged up', with the towed bow sitting right inside the V essentially forming a single vessel. Ice pressure is mitigated and the two vessels move as one.

⁶³ A pair of navigation systems on board CCGS SIR WILLIAM ALEXANDER utilized satellite positioning and an automated recording function. Ship's position and movements were derived from this data.

⁶⁴ Satellite positioning indicates a location relative to a fixed geographic grid, this position and speed is "over the ground".



Figure 15: Satellite Ice Imagery Off Cape Breton for 27 March 2008

speed, confirming the application of a powerful astern movement as reported. None of these speeds denote excessive or reckless conduct and were described by one subject matter expert as being reasonable and the minimum expected to make way through the ice conditions experienced that night.

In the case of the L'ACADIEN II, it is clear that the bridge team⁶⁵ of the CCGS SIR WILLIAM ALEXANDER, in particular the helmsman and the Commanding Officer who himself was at the throttles, worked to balance the speed required to make headway in the prevalent ice conditions with the finesse required by the risks of towing such a small vessel through ice. Even as the trio came across an open water lead where the absence of ice allowed a surge of 4.1 knots (7.59 km/h), the maximum speed attained during the 2½-hour passage, speed was reduced almost immediately to 3 knots (5.55 km/h) to allow the tow to settle into these new conditions, with concern given again to observing the potential movement of the towed vessel.

The courses selected through the night allowed the CCGS SIR WILLIAM ALEXANDER first to rendezvous with the MADELINOT+WAR+LORD, making an easterly

heading and then one more south-easterly, all the while making for open water as depicted in the satellite information available to the Coast Guard, illustrated in Figure 15. The path immediately opened the distance from the lee shore and closed the distance to Sydney, the nearest port where CCGS SIR WILLIAM ALEXANDER could take L'ACADIEN II for repair.

BRIDGE WATCH IN CCGS SIR WILLIAM ALEXANDER AND ACTIONS OF THE BRIDGE TEAM

The bridge manning in CCGS SIR WILLIAM ALEXANDER on the night of 28/29 March consisted of three personnel: Commanding Officer, Watch Officer and Helmsman. This represents two deviations from the norm: first, in that the Commanding Officer is not normally on the bridge during normal night transits and, second, a second seaman is usually called for as lookout. It is clear that the complexities of the tow and risk at play in manoeuvring a towed vessel through ice called for the Commanding Officer's experience and decisions explaining why he was on the bridge and kept the con⁶⁶ throughout the evolution. Additionally, it had been decided that the towing watch, normally a single seaman keeping watch on the stern of the ship, would be doubled in view of the conditions and the complexities of towing in ice. Given the dearth of traffic, the creeping speed and low risk of collision danger, the investigation considers this to have been a reasonable balancing and prioritization of limited personnel resources during the conduct of the tow.

Subsequent to the accident, it should be noted that the demands of responding to the capsize of the L'ACADIEN II completely consumed this small bridge team. The team was then required to raise alarms, handle the ship, communicate with authorities ashore, brief their personnel, launch the FRC, record events and plan for contingencies. They were operating at the full extent of their capabilities and according to

⁶⁵ The bridge of the CCGS SIR WILLIAM ALEXANDER was manned by the Commanding Officer, Officer of the Watch and one seaman who acted as both helmsman and lookout.

⁶⁶ While a Commanding Officer always retains *command*, control of the ships movements, or the con, is regularly delegated to a qualified Officer of the Watch. Difficult or demanding evolutions such as coming alongside, transiting narrow passages or demanding seamanship manoeuvres, will often see the Commanding officer take the con. Such was the case when towing the L'ACADIEN II.

priorities as they perceived them. An additional seaman would not have helped manage this load, as he would most likely have been immediately released from duties on the bridge anyway, the better to apply his seamanship skills to launching the FRC or working the boat hoist or crane.

VHF communications next became very active including calls from the MADELINOT WAR LORD advising of concerns as the collision with the ice was occurring, facts which were already known in the wheelhouse of the CCGS SIR WILLIAM ALEXANDER. Because the bridge team was actively engaged in manoeuvring the vessel and many other aspects of bridge management, and were sometimes unable to break in on the channel in response, the bridge team, including the Commanding Officer, undertook higher priority activities until they were able in due course to resume communications with the vessels in their vicinity.

CAUSE OF THE SHEER TO PORT

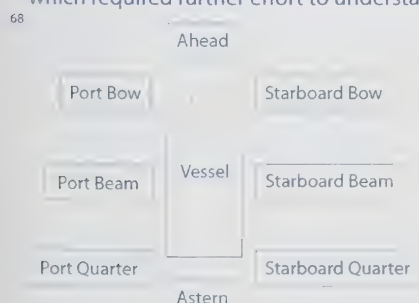
Apart from the decision to engage in the act of towing itself, the centre of interest for the investigation team lay in the cause of what appeared to be a sheer to port experienced by L'ACADIEN II. According to the eye-witness testimonies⁶⁷, this movement occurred once in open water and just prior to the L'ACADIEN II colliding with the single cake of rafted ice on the port quarter of CCGS SIR WILLIAM ALEXANDER. Indeed, without this movement to the quarter⁶⁸, and possibly beyond the wake astern and broad onto the quarter, the collision with the ice would likely not have occurred.

Speed of the tow has the potential to impart yaw on a towed vessel, as does an engine movement on the part of the vessel being towed. The former is addressed by the use of a bridle; the latter is simply avoided by good practice. There is also the possibility, albeit slim, that a smaller body of ice might have become caught up on the hull of L'ACADIEN II, changing the dynamics of how the vessel was moving through the water, and causing a movement to port. The description of comparatively open water at the time of the accident argues against this possibility and an addition to the trailing weight, or drag, would serve to mitigate against a sheer rather than increase it.

In considering the possibility of a sheer, thought was given to whether the ice cake with which L'ACADIEN II collided had in fact been sucked into the wake of the Coast Guard ship to cause contact directly astern as opposed to on an angle on the port quarter. The slow speed of the ships, some 2.8-3 knots (5.18-5.55 km/h) on approaching the particular ice cake, would provide very little suction effect along the hull of the CCGS SIR WILLIAM ALEXANDER. The hull form of an icebreaker is specifically designed to push ice away with the intent of leaving the path astern clear of ice, all the better to conduct escort work.

The size and weight of the ice, some 10 m across, sufficient to snag the L'ACADIEN II and remain comparatively stationary despite the pull of the icebreaker, similarly speaks to the unlikely effect of suction into the wake. Thus, it is illogical to surmise suction effect as the cause of the convergence. These factors, along with the majority of testimony from the eyewitnesses in L'ACADIEN II and the CCGS SIR

⁶⁷ All but one of the eyewitnesses observing from all three vessels involved, spoke about to some form of movement by the L'ACADIEN II from a position directly astern to a position astern to port or off the port quarter. The rapidity of the movement, the actual final placement astern and to port, and the duration of time which passed before the collision with the ice occurred varied to some degree, but the investigation found a degree of consistency which required further effort to understand. The decision to complete a range of trials to replicate the described motion was the result.



WILLIAM ALEXANDER, confirm that the L'ACADIEN II moved into the path of the ice as opposed to the ice moving into the path of the fishing vessel.

Tremendous scrutiny was given to the fact that a sheer to port may have served as the means of allowing the L'ACADIEN II to strike an ice remnant that was passing clear down the port side of the icebreaker. The means by which the sealing vessel moved to port, sat steady on the port quarter for some moments, perhaps only seconds according to several accounts, and failed to react to the corrective influence of the port bridle provided a quandary in analysing the events.

Testimony confirmed that while ahead and astern movements were used in an effort to address tension or slack in the towing cable on several occasions, no active use of power was purposely applied in L'ACADIEN II in the moments prior to the accident, apart from a burst of full power when the collision with the ice was immediately imminent, in the hopes of smashing the ice and breaking through it. Conversely, a passive towed vessel, one generating zero speed from within, cannot have moved in the way observed to a position as far off the quarter of CCGS SIR WILLIAM ALEXANDER. The physics do not allow for it. The scenario where ice may have caused the movement exists in the spectrum of possibilities, but represents an extremely unlikely possibility. Witnesses from all three vessels commented on the fact that the three ships had entered an open lead, with one survivor commenting that the only ice he saw at the time of the incident was the one L'ACADIEN II struck.

In seeking the cause of the sheer, six separate towing trials were conducted as described in **Annex F**. In five key trials, a Coast Guard vessel of dimensions equivalent to the CCGS SIR WILLIAM ALEXANDER served as the towing vessel. In one trial conducted in Arctic summer ice, a larger platform than the CCGS SIR WILLIAM ALEXANDER was employed. The towed vessels included a 47' (14.3 m) rescue cutter,

a 42' (12.8 m) cutter, a sister ship to the L'ACADIEN II and, finally, an unmanned utility barge⁶⁸ used to safely demonstrate ice collisions.

The first trial was inconclusive as it was not possible to recreate the sheering due to a dissimilar hull form, size and rudder arrangement⁶⁹. The second trial, which towed a vessel of similar dimensions, confirmed the value of the bridle in dampening any yaw and demonstrated that the only means of replicating a sheer to port, sufficient to achieve a position where collision with ice such as occurred was possible, included engine power on the part of the towed vessel. Even minimum idle speed proved sufficient to initiate the movement to port, the key point being the differential between the speeds, however minor, of the towing and the towed vessel. Also important was the element of sustained momentum, achievable only with engine power of the towed vessel, where trials of unpowered towed vessel always demonstrated the useful effect of the bridle and an inclination to stay in a position astern after use of helm or external forces.

In the two early trials, rudder alone was unable to impart the necessary movements, giving pause to consider if the large blade of the L'ACADIEN II's rudder might have been sufficient to impart the manoeuvre on its own. With this lingering question, a third trial with a sister ship, a vessel as near in shape, dimension and construction as was possible to find, was arranged and conducted. Here again, with no engine power and the rudder amidships, the bridle acted as per the theory, holding the towed vessel in a relatively position aligned astern. Subsequent application of the rudder, even full helm, caused only slight and momentary deviation from the centre-line, the effects of the bridle serving to overcome the motion imparted by the blade of the rudder. Use of engine alone, even idle speed, served as the only means whereby a yaw to port of sufficient degree and duration was replicated. With greater engine power, this yaw became a sheer.

⁶⁹ Similar to a small landing craft.

⁷⁰ Though the lessons gleaned from the trial were useful, the different size, weight and hull form, as compared to L'ACADIEN II, left questions about the validity of what had been replicated.

The barge towed in ice did not contribute in a measurable way to a better understanding of the physics of the accident and was limited by the inability to replicate with any precision the size and mass of the ice floe of the night of the accident. From an investigatory re-creation perspective, the effort succeeded in demonstrating the wide variability of factors which ice can deliver. However, the main value in conducting the trial lay in delivering footage of the impact of ice collisions of a small vessel while under tow by large one. That the context for this last trial included manipulations and manoeuvres which were unrealistic as compared to the actual accident cannot be overstated, and in turn again speak to the forces required to produce the collision.

The fifth and sixth trial sought to replicate the observations of the previous trials and to collect a wider range of footage to illustrate the observations. In one case, as towed vessel of only 10 tons was utilized illustrating the different characteristics of such a light craft.

The conclusion to be gleaned from the range of trials suggests that it was impossible for a towed vessel to reach the position in question through passive means alone. In no trial was it possible to achieve the position of L'ACADIEN II reported by the wheelhouse survivor or by the witnesses in CCGS SIR WILLIAM ALEXANDER. It appeared that power of some sort was the required, key element.

In considering this, and accepting at face value the testimonies confirming that no active engagement of engine power was put into play on L'ACADIEN II, the potential for clutch slippage or an inadvertent shift to idle, serve as possible explanations for the manoeuvre observed. Alternatively, a notable jostling of L'ACADIEN II by a smaller block of ice, witnessed by one observer in the MADELINOT WAR LORD, may have caused inadvertent engagement of the throttle, the drive linkages or caused some other mechanical impetus to the engine which was not recognized by those in the wheelhouse of L'ACADIEN II. Whatever the source of power, unconfirmed as it is, it remains that multiple attempts in four trials demonstrate that only engine power could replicate the movements of

the L'ACADIEN II on the morning of 29 March just prior to the collision with the ice which caused the capsizing.

In sum, the reason for the sheer cannot be absolutely known. What is clear is that the CCGS SIR WILLIAM ALEXANDER lost control of the tow at a critical moment, whatever the reason, allowing the L'ACADIEN II to come into contact with a dangerous ice cake.

USE OF ENGINES BY L'ACADIEN II UPON COLLIDING WITH ICE

When first sighted by the wheelhouse crew of the L'ACADIEN II, off the port side of the CCGS SIR WILLIAM ALEXANDER in the darkness of the midnight watch, it appeared as if the ice cake would pass clear without incident. It was moments later that the risk of collision was apparent, indeed imminent. As reported by the wheelhouse witness in L'ACADIEN II, a full application of ahead engine power was applied through the throttles in the very instant before the collision with the ice. Having seen the ice mass and having concern for its size, clear potential for parting the tow, or worse, became immediately evident.

Unable to steer to starboard because of the steering's mechanical failure and deciding that steering to port would only exacerbate the situation, a decision on ahead or astern motion had to be made. In an instant, it was determined that a full ahead motion would be used in an effort to shatter the ice and break through so that the tow could be continued. This clearly did not result as intended.

With perfect hindsight, an astern movement might have been a better choice, though it is uncertain if even such a major application of astern power would have changed events significantly, applied at this juncture. What is clear is that this ahead movement did not in itself cause the collision with the ice, which was imminent and inevitable at the point of decision, nor did it contribute in any measurable way to the method in which tension was subsequently applied on the tow-line, resulting in the capsizing. To clarify, this ahead movement was neither effective in avoiding or minimizing the collision, nor did it contribute to the final capsizing motion of the L'ACADIEN II.

THE COLLISION WITH ICE

The specific physical forces at play during the moments from the collision with the ice through to the capsize of the L'ACADIEN II were considered important in understanding the accident and for the potential of lessons learned. The issues of physical forces, stability and vessel construction required such significant analysis that the services of a naval architect, were retained to deliver a full analytical report. The calculations had to take account of a range of possibilities given that witness testimonies differed about the L'ACADIEN II's contact with the ice cake and the subsequent girding⁷⁰ action and capsize. The analysis considered a range of plausible scenarios as recounted by the witnesses, including the variables of the location of the L'ACADIEN II relative to the icebreaker's stern, the angle of the tow-line off the bow of the L'ACADIEN II, and the degree to which the sealing vessel's hull was immersed in water or riding on the ice.

The analysis first confirmed that the 3.8 cm (1.5") diameter tow-line was exceedingly robust for the towing arrangement and the size of vessel being towed and would never have acted as the point of failure for the tow. This meant that even under the maximum strain which might be experienced during the towing operation, it would not be the tow-line which failed or parted. It would not serve as the weakest link. Second, the analysis concluded that the ice was the crucial factor in causing the capsize and that the bridle arrangement in open water, in concert with the inherent stability of the L'ACADIEN II, would not be the cause of a girding action.

In calculating the range of possibilities at play that night, the angle of the tow-line, the degree of emersion imposed by the ice, and even the angle of contact on the ice, were considered. It was assessed that once the L'ACADIEN II was restrained by the ice and tension on the tow-line increased, stability was

compromised and the angle of pull shifted from ahead of the L'ACADIEN II to the diagonal or even the perpendicular. It was similarly concluded that, with the forces involved given a constant towing speed of 2.8 knots over the ground (5.18 km/h), the period of time from contact to capsize would range from 1 second to 18 seconds, depending on the scenario, with the scenarios described by the majority of witnesses pointing to a 1 to 7 second time-span from contact to capsize. This represents the window available for realizing, deciding and acting to avoid a disaster.

LOCATION AND ACTIONS OF THE TOWING WATCH

As the tow of the L'ACADIEN II commenced, it was determined that the environmental conditions, the duration of the tow, the risks and complexities of the evolution combined to require an augmented towing watch of two seamen as opposed to the normal single lookout/sentry on the afterdeck. This conclusion had been arrived at by the Chief Officer and the Bos'n, and had been briefed to the Commanding Officer. The two-man watch was set as the tow settled in shortly after 23:00 on the night of 28/29 March.

The two seamen were briefed on what to expect during their watch, advised of the communications protocols and the VHF working frequency to be utilized (VHF Ch19) and directed to cut the tow without further direction from the bridge should the need arise to address any problems with the tow. The two, with a VHF handheld radio and an axe placed at the towing fairlead, took up their vigil and kept watch on the tow. Some moments of concern occurred early in the tow as the L'ACADIEN II was pulled by the tension of the tow-line in the sliver of clear water close astern of CCGS SIR WILLIAM ALEXANDER. On at least one occasion, a close call and a near decision to use the axe because of tow-line tension was not reported to the bridge. In hindsight, it is clear that it should have

⁷¹ GIRDING – A danger of capsize resulting from the disparate size of two connected vessels, normally a scenario with a small tug and a large towed vessel such as a tanker or bulk carrier. This is especially dangerous when a tug is towing on the beam and lack of awareness or judgement in such circumstances may manoeuvre the tug into a helpless position with danger of capsizing. The danger of girding arises when the smaller vessel is towed broadside by the tow rope and is unable to manoeuvre out of this position. The forces at play are immense and the resultant movements quick. Once girded, a vessel can capsize so quickly that crew members do not have the time to operate a tow-abort control, if present, or use the available life-saving equipment.

been, the omission was the result of a reticence to engage the bridge on the part of the seamen and, in part, an inaccurate assumption that the situation was both visible and known by the bridge personnel⁷¹.

As time went on, occasional slams against the ice border occurred and at times the tow-line seemed to be under some severe strain, but on the whole the evolution proceeded without incident. At 00:30, the oncoming watch was awakened, making their way aft for their handover at about 00:50. They were advised of the condition of the tow, the communications arrangements and the occasional anxious moments during the past two hours. Noting the glare of the three fixed floodlights illuminating the waters directly astern, the oncoming watch switched off the series of small overhead lights above the towing area, the better to see into the darkness abeam and ahead. They verified the placement of the axe alongside of the towing fairlead and checked the battery charge on the radio, calling to advise the bridge of the change of the watch⁷². It should be noted that one point was missed with one of the oncoming seamen who was not or does not recall being advised of the directive to cut the towline if necessary should a problem arise. This omission was inconsequential however, as in testimony this experienced seaman felt it was simply common sense to cut the line should the situation demand — that is what he was there for⁷⁴. This raises the question of whether ‘common sense’ is sufficient as compared to formal procedures and acknowledged roles.

Left on their own, the pair of seamen spent the initial portion of the watch on the starboard side of the tow-line storage drum. One seaman eventually moved to a position to port of the towing fairlead, just forward of the centre-line floodlight looking aft. The second

seaman moved from one side to the other, generally forward of the towing drum, so as not to straddle the towline on the occasions that it was under strain. He was on the starboard side as the L’ACADIEN II seemed to sheer to port just prior to the accident⁷⁴.

The aft seaman moved towards the port quarter of the afterdeck as the L’ACADIEN II sheered to a position on the quarter of the CCGS SIR WILLIAM ALEXANDER, noting a large mass of ice coming out of the darkness just seconds before L’ACADIEN II collided with it. With strain coming on the tow-line and bridle, a reflex concern over the line parting determined that he would warn the bridge of how the L’ACADIEN II was being dragged sideways so that speed would be taken off prior to the situation worsening. Turning back after the radio call, seconds later, and seeing that the sealing vessel was falling off the ice and rolling over, he grabbed the axe and cut the line with a single stroke. Looking back again, he saw that L’ACADIEN II had capsized.

⁷² According to the seamen on watch, the situation aft did not warrant contacting the bridge. There was a sense that visibility from the bridge windows and outer wings was sufficient to observe the state of the tow.

⁷³ The radio call from the after watch to the bridge was received, acknowledged and logged.

⁷⁴ During an interview, this seaman was adamant that no guidance regarding the line was given. He said that he had been part of many towing evolutions and that this was just common sense, that he didn’t need the bridge to direct him to act in a safety situation.

⁷⁵ Both seamen on watch commented on their perception that the L’ACADIEN II was overtaking the icebreaker, putting slack in the tow-line and bridle as the sealing vessel moved to port fairly rapidly. Both men perceived the L’ACADIEN II to be broad on the quarter, perhaps 45-60 degrees off the centre-line, when the collision with the ice cake occurred.

SHIP DETAILS

Official Number: 607685
 Vessel Type: High Endurance Multitasked
 Vessel - Light Icebreaker
 Port of Registry: Ottawa
 Region: Maritimes
 Home Port: Dartmouth, NS, Canada

COMPLEMENT

Officers: 12
 Crew: 15
 Total: 27
 Crewing Regime: Lay Day
 Available Berths: 9

PHYSICAL DIMENSIONS AND STATISTICS

Length: 83 m
 Draft: 5.75 m
 Hold 1: 840 m³
 Hold 2: 0 m³
 Main Deck Area: 210 m²
 Forecastle: 78 m²
 Gross Tonnage: 3727.17 grt
 Cruising Speed: 13.7 kts
 Cruising Range: 6500 nm
 Fuel Consumption: 6.5 m³
 Fresh Water: 112.3 m³
 Breadth: 16.2 m
 Freeboard: 1.7 m
 Hatch Size 1 (l x w): 5.5 m X 5 m
 Hatch Size 2 (l x w):
 Boat Deck Area: 168 m²
 Afterdeck Area: 133 m²
 Net Tonnage: 1534.61 nrt
 Max. Speed: 16 kts
 Endurance: 120 days
 Fuel Capacity: 784 m³

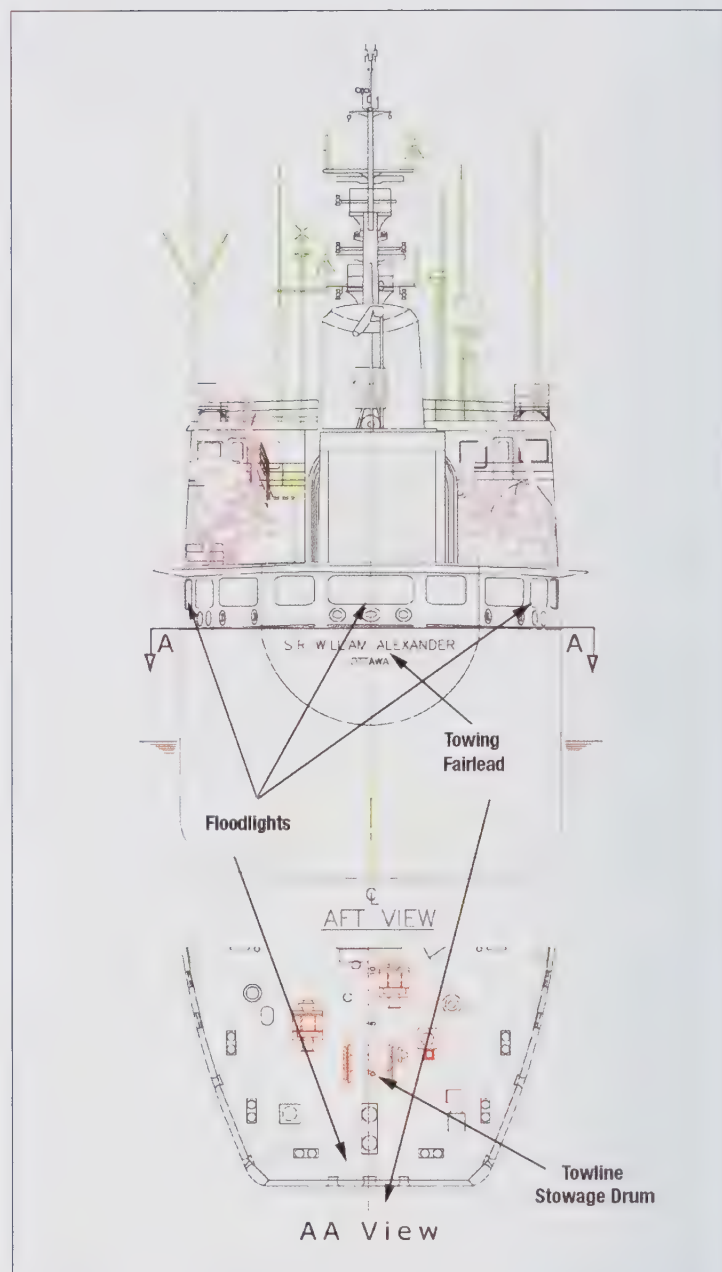


Figure 16: Stern view of CCGS SIR WILLIAM ALEXANDER and diagram of after towing deck

It is clear through documentation, the radio check-ins and by the level of detail in the testimony of the seamen, that the pair of two-man watches were appointed, on deck and observant of the situation leading up to and at the time of the incident. It is equally clear that they were not always visible to the wheelhouse crew of the L'ACADIEN II or MADELINOT WAR LORD through the duration of the tow.

A possible reason the oncoming watch may not have been visible may be related to the fact that the overhead lights were turned off as they assumed the watch, though both observed the glare from the MADELINOT WAR LORD's working lights shining up at them. More likely, their location on the aft towing deck may well have shielded them from view, with one seaman predominantly located by the storage drum forward and the second, when at the stern-rail, standing just forward of the centre-line flood-light, essentially within the strong bright glare of the light.

UTILIZATION OF LIGHTS

In the urgent moments immediately following the capsizing of the L'ACADIEN II, witnesses in MADELINOT WAR LORD perceived that the spot-lights on CCGS SIR WILLIAM ALEXANDER were turned off, just as the MADELINOT WAR LORD was attempting her approach on the overturned L'ACADIEN II to rescue survivors.

It was in fact the three floodlights aft, with fixed projection astern that were illuminating the tow, not the search light arranged atop the helicopter hangar (that was actually never used that night) nor the ones that are fitted on top of the wheelhouse that can only be pointed forward of the vessel.

As the L'ACADIEN II was seen to bear down on Ice cake and the accident was about to occur, full power astern was put on the engine throttles by the Commanding Officer, causing the stern of the CCGS SIR WILLIAM ALEXANDER to swing to port. This caused the effects of the three flood-lights to dim as their fixed beam swung about. As the swing progressed, the flood-lights would



Figure 17: View of CCGS SIR WILLIAM ALEXANDER from approximately 25m astern, depicting the three fixed floodlights and deckhead lighting

appear to go out, apparently with timing to suggest that the MADELINOT WAR LORD was just on the verge of arriving atop the hull to effect rescue.

MADELINOT WAR LORD herself had powerful working lights mounted fairly high in her rigging, in effect providing illumination on at least a portion of the scene, enabling CCGS SIR WILLIAM ALEXANDER in turn to approach the site of the capsized.

THE DECISION TO CUT THE HULL

One of the more demanding and stressful decisions made in the early hours of 29 March concerned the option of cutting into the hull of the L'ACADIEN II in the hopes of reaching potential survivors. It must be understood that the salvage equipment on board CCGS SIR WILLIAM ALEXANDER was limited⁷⁶. Though

⁷⁶ The Coast Guard has no mandate for salvage, an activity generally referred to commercial enterprises. Though every Coast Guard ship has damage control equipment, this is for self-preservation and fire and flood emergencies. No inflatable float bags were available and the lack of salvage equipment and expertise, suggested cutting into the hull was to be avoided.

the hull of the capsized vessel was reasonably well secured by strops and lines, the hold was tenuous and the list felt by the CCGS SIR WILLIAM ALEXANDER as a result of the weight only confirmed the risks at hand. The rescue manuals all recommend against cutting into an overturned hull, lest the stricken vessel be lost with survivors trapped inside, or crewmembers become caught in the cabling and dragged to their deaths in what might become a sinking hulk. Although the Commanding Officer was not concerned about capsizing the CCGS SIR WILLIAM ALEXANDER, there was a real risk of damage to the crane and cabling as well as potential injury to his crew. These factors weighed on the Commanding Officer as he consulted with Coast Guard management ashore about cutting into the hull.

These risks were considered on balance with reports of knocking from inside the hull of L'ACADIEN II and vocal insistence from MADELINOT WAR LORD to take the risk while time still permitted possible success in helping a trapped crewmember. The potential option

of diving to effect rescue represented the best scenario available at that juncture, but time was running out. The potential of the arrival of divers, a less risky approach to rescue, first convinced the Commanding Officer of CCGS SIR WILLIAM ALEXANDER to put off any attempt at cutting the hull, lest he lose the people he was hoping to save. But reports of a delay to their arrival⁷⁷ and acknowledgement that the energies of any trapped crewmembers would be waning convinced him to engage in what can only be described as a desperate effort to rescue any trapped crewmembers.

Unfortunately, the attempt proved futile, as no crewmembers in fact had made their way to the engine compartment, the only space crewmembers of L'ACADIEN II could have reached from within the accommodation compartment which in turn could be reached by piercing the accessible section of the overturned hull.

THE DECISION TO DIVE AND TO COMPLETE DIVE OPERATIONS

Subsequent to the attempt at piercing the hull, the first of two dive teams to arrive onboard the CCGS SIR WILLIAM ALEXANDER by CORMORANT helicopter were hoisted down to the deck. The dive supervisor quickly took in the scenario, being made aware of many issues at the scene which augmented the information received before take-off and en route.

Key to the dive supervisor's assessment were indications that rescuers had heard knocking from within the hull. Determining that the potential for survivors still existed, a decision was made to bring in the second dive team and undertake a full rescue effort. At great personal risk, two SAR Techs from CFB GREENWOOD joined the rescue effort by parachuting from their HERCULES aircraft directly onto the ice. The second dive supervisor confirmed the factors at play and supported the decision to dive. What is pertinent in this choice is the clear SAR policy that



Figure 18: Bringing the circular saw into action

⁷⁷ JRCC advised that a failure in communications equipment had delayed the launch of the SAR Techs from CFB GREENWOOD.

dangerous operations such as the penetration dive that was required in this scenario are only authorized in search of the living, not in an effort to recover the deceased. In this case, though the interval since the victims had become immersed in water suggested that chances of survival were slim, the report of knocking on the hull provided sufficient faint hope to justify the dive.

The level of risk taken by the dive team through four consecutive dives cannot be overstated. The possibility of entanglement or entrapment was significant. All suffered some degree of hypothermia in the ice covered waters. Their thin synthetic suits provided little thermal protection in these extreme conditions. The decision to cease diving operations was founded on the impact of the physical effects of the hypothermia, the augmented risks such physical debilitation now represented to the team, and the assessment that, having recovered three of the four missing crewmembers, the search effort could no longer presume the missing crewmember to be alive. Rather than continue to push the dive team against serious and elevating risk, it was decided to complete dive operations at the end of the fourth dive.

THE DECISION TO DEPART THE SCENE

Issues related to the potential salvage of the L'ACADIEN II had been referred to management ashore, as the case had now passed from the realm of Search and Rescue, both within the offices of the JRCC and in the context of the operations of the CCGS SIR WILLIAM ALEXANDER. Other cases and priorities in the region were putting demands on the limited sea-going units available.

From the perspective of the CCGS SIR WILLIAM ALEXANDER, three issues served to determine the course of action decided upon: maintaining the hull afloat with strops in fact presented risks to the ship and could not be sustained indefinitely; it was clear that she couldn't salvage the vessel; and, the need

to deliver the fatalities ashore to the appropriate authorities in a timely manner began to elevate in importance and priority.

After a series of deliberations with JRCC and Coast Guard management ashore, the CCGS SIR WILLIAM ALEXANDER was released from the active SAR cases of L'ACADIEN II and the MADELINOT WAR LORD. Thus, the departure of the CCGS SIR WILLIAM ALEXANDER for Sydney Harbour does not represent a decision to abandon the stricken hull, but represents the priority of transporting the lost sealers expeditiously and with dignity⁷⁸. The attempt to leave a marker beacon on-scene demonstrated the desire and the intent to track the hull.

Instructions for deploying the buoy were received from JRCC, who advised the CCGS SIR WILLIAM ALEXANDER to place the buoy on the ice. The intent was to have the buoy close to the L'ACADIEN II and preclude the buoy from being crushed if it was left afloat. The instructions were taken literally and the buoy was activated manually and then put on the ice beside the L'ACADIEN II. Because the buoy battery requires salt water activation, placing it on the ice did not activate the electronics and start generating the signal. Whether the buoy was damaged before it later fell into the water, or if the buoy was defective, is unknown. The signal on these particular buoys is not receivable in the CCGS SIR WILLIAM ALEXANDER, so the crew never realized the signal had not been activated until informed much later.

5.2 ASSESSING SYSTEMIC FACTORS

A number of issues which contributed to events on the night of 28/29 March are worthy of discussion and fall into the category of organizational or systemic factors. None can be described as causal in any direct sense, but addressing any or each of these topics can certainly be viewed as potentially preventative. The issues have the potential of touching on a number of Coast Guard jurisdictions

⁷⁸ Jurisdiction over the victims fell under the authority of the Nova Scotia Medical Examiner, whose agents, the RCMP, expressed the desire to move into that stage of their investigation. The families of the victims were also inquiring as to the expected delivery of the bodies to the Magdalen Islands so as to make funeral arrangements.

and perhaps those of organizations outside of the Coast Guard, Department of Fisheries and Oceans or Transport Canada. All are considered worthy of consideration and liaison with Departmental partners.

Of note, in exploring the Canadian regulations related to construction of vessels for operating in ice, only those engaged in the seal hunt were found to have, at least until 1993, defined regulatory standards. None were found to exist for general or commercial vessels working in ice, either occasionally or with consistency, such as ferries, tugs and the like.

REGULATIONS GOVERNING THE CONSTRUCTION AND INSPECTION OF VESSELS USED IN THE SEAL HUNT

Two aspects of regulation are applicable to the circumstances around the L'ACADIEN II tragedy and this year's seal hunt as a whole; the validity of the rule-set which is in place and the effectiveness of the inspection regime in ensuring compliance. Neither issue resides within the authority of the Coast Guard, though clearly, Coast Guard assets and resources are the ones to respond, and their resources expended, whenever the limitations of the rule-set and inspection regime allow things to go wrong.

This year's Gulf of St. Lawrence hunt was clearly disappointing, as viewed on the whole by sealers themselves, let alone the JRCC and seagoing Coast Guard community. It is worth considering if the small sealers such as L'ACADIEN II, MADELINOT WAR LORD and others found on the list of JRCC listing of SAR cases that weekend should ever have been allowed to engage in the hunt with ice conditions as bad as what was at hand, only to dash themselves onto the ice and risk expensive damage or worse. Alternatively, if permitted to hunt in the conditions experienced this year, then the level of support to their efforts must be augmented. Whether the statistics regarding the rate of inspections of sealing vessels bound for the ice can illuminate a possible trend regarding damage rates is uncertain - it is clear that the issue of the size and construction of vessels was pertinent and must be revisited.

SEALING SHIP CONSTRUCTION REGULATIONS

These regulations came into force in November 1954 and covered the construction and inspection of ships engaged in sealing. They were revoked in 1993 after Transport Canada concluded that they were obsolete. The Regulatory Impact Analysis Statement mentioned that legislation changes had made the regulations unnecessary given that the requirements were already covered by administrative policy or by other regulations and that technological developments had made them obsolete.

They specified special requirements for hull thickness reinforcements to resist damage from ice pressure and ice abrasion for wooden ships and required that steel ships be built in accordance with recognized classification society rules applicable to vessels navigating in ice. Furthermore, they specified the requirement for rudder and stern frame reinforcement, an increase to shaft and propeller diameter and special provision for cooling water system inlet and overboard discharge valves. Finally, the vessels were required to be dry docked every year for inspection.

SMALL FISHING VESSEL INSPECTION REGULATIONS

The seal hunt is considered a commercial fishing activity, therefore the vessels used for the hunt are now subject to the Canada Shipping Act Small Fishing Vessel Inspection Regulations. These regulations contain no provision for addressing the risk of ice damage posed to vessels that may operate in ice-covered waters, such as during the seal hunt. The majority of the fishing vessels involved in the hunt are constructed of wood, fibreglass or a combination of both. Some, a minority, are made of steel or aluminium. Typically, their hulls, shafts, propellers, and rudders are not strengthened or reinforced for navigation in pack ice, having been built for open-water fishing and outfitted temporarily for participation in the hunt. Pertinent to this discussion is a passage from the TSB Report on the sinking of the JUSTIN M on 29 March 2005:

A seaworthy vessel is fit for navigation on the sea or a navigable waterway. A vessel must not be put out to sea unless she is seaworthy. After a vessel is inspected by a maritime authority, a certificate is issued to certify that the vessel meets the applicable standards for construction and safety and is seaworthy. The vessel must be appropriately built, equipped and crewed for the task intended.

Transport Canada Ship Safety is aware that fishing vessels at Îles de la Madeleine are used in winter seal hunting in ice-infested waters. Fishing vessels that are used for fishing are not designed or strengthened for navigation in ice-infested waters. The practice is apparently tolerated by Transport Canada Ship Safety.

Of note, the hull of L'ACADIEN II was strengthened for ice. The robustness of her rudder appears simply to have been inadequate for the conditions in which she found herself operating⁷⁹.

2007-2008 STATISTICS

The winter of 2007/08 recorded 43 SAR cases which had been opened for vessels involved in the seal hunt out of which 4 were lost and one abandoned. It is worth noting the caveat that not all damage scenarios are reported in the SAR system.

The TSB investigation report on the sinking of the JUSTIN M reports that:

Between 1990 and 2005, during the months of March, April, and May—some 48 months of sealing activity—227 occurrences involving fishing vessels operating in ice-covered water were reported through CCG radio stations. The majority of these involved hull damage, with a total of 21 vessels lost, although there was no loss of life. The investigation also revealed that many more incidents are not reported.

DEPARTMENT OF FISHERIES AND OCEANS MONITORING

The seal hunt is closely monitored and tightly regulated. The mandate of Fisheries Officers deployed to the ice is to monitor sealing activity, ensure humane harvesting practices and enforce regulations and licence conditions. They conduct surveillance of the seal hunt by means of aerial patrols, at-sea patrols, dockside inspections of vessels at landing sites and inspections at the point of purchase and processing facilities. The Department of Fisheries and Oceans also regulates the number of sealing licences, allocates quotas, limits the size of vessels that can participate and specifies the opening and closing dates of the annual seal hunt. The location of the seal herd is determined by a combination of the over flights and Advanced Research and Global Observation Satellite (ARGOS) buoys deployed by the science sector of the Department of Fisheries and Oceans. The information is provided to the Fisheries and Aquaculture Management offices for the purposes of resource allocation, conservation and protection, and in turn is communicated to sealers and holders of observation licenses upon request, to various levels of detail and precision depending upon the need.

CANADIAN COAST GUARD SUPPORT TO THE SEAL HUNT

The Coast Guard is charged with supporting legal seagoing commerce of all types, including the fishery and the seal hunt. As an organization, it exists essentially to ensure the safe use of Canadian waterways, and to facilitate and support the smooth functioning of the Canadian ocean-going economy. This responsibility resides within a spectrum of goals and missions which include sovereignty, SAR, research and aids to navigation maintenance, amongst several others. The availability of resources and the demands of sometimes shifting priorities determine the type and duration of effort applied to each endeavour.

⁷⁹ A naval architect's review of the construction drawings found a robust reinforcement scheme to the hull that represented effective ice hardening. The rudder arrangement, external to the hull, was not similarly reinforced nor equipped with a robust guard or shroud.

In considering the issue of Coast Guard support, particularly as it applies to the seal hunt, it is pertinent to express the frustrations on the part of a number of stakeholder witnesses. For part of this community at least, expectations of service appear not to have been met in recent years. Of concern has been consistency and duration of Coast Guard vessel presence, information sharing, as well as actual levels of assistance for ice escort. It appears that inadequate communications, at least as described by the small sampling of sealers from the Magdalen Islands engaged during this investigation, have some sealers wondering why they are being moved in one direction and not another, let alone why they don't know where the heart of the seal herd may be. In essence, this points to the question of whether the Coast Guard and the Department of Fisheries and Oceans exists, at least in part, to aid and abet the hunt or not.

ICEBREAKING

The Atlantic winter weather can bring harsh challenges for ships navigating on the east coast of Canada. Two metre thick ice and six metre high ridges are common off the north-east coast of Newfoundland and in the Gulf of St. Lawrence. Canadian Coast Guard icebreakers provide services to a variety of vessels in Canadian waters, including the Gulf of St. Lawrence. To reduce risks, icebreakers escort ships and organize convoys through ice-infested waters; they free trapped vessels, maintain shipping channels in fast ice and stand by in areas where requests for route assistance are likely. During the ice season, the Coast Guard icebreakers provide secondary support to other Department of Fisheries and Oceans/Canadian Coast Guard programs, namely;

- search and rescue coverage in ice covered waters and response to marine emergencies;
- provision of Marine Navigation Services in ice-covered waters, i.e. repositioning winter spar buoys to mark channels; and
- support to the Science and the Conservation and Protection Programs.

The Canadian Coast Guard receives numerous requests for assistance from vessels during the seal harvest. The icebreaking program priorities are detailed below as dictated by policy and must be considered in an operational context when delivering the service;

- all distress and emergency situations take precedence;
- service requests from ferry services provided in accordance with the Terms of Confederation/Union will be given priority; other ferry services will receive priority as deemed appropriate by the Canadian Coast Guard;
- ships with vulnerable cargoes (i.e. pollution potential of cargo, dangerous goods, perishable) and vessels transporting cargo which is vital to the survival of communities; and
- marine traffic and fishing vessels.

Canadian Coast Guard vessels assigned to a fisheries role will regularly help vessels manoeuvre out of ice fields so as to approach the herd, with other vessels sometimes using the resultant open track in the ice for easier passage. Like any other Canadian Coast Guard vessel, they are also available for response to SAR when called. In respect to the 2008 Gulf of St-Lawrence Seal Hunt, the Canadian Coast Guard had assigned a dedicated vessel, the CCGS DES GROSEILLIERS, to support Fishery Officers in the enforcement role, requiring them to be near the seal herd to monitor sealing activities.

SAR VESSELS

Primary SAR vessels are a specially designed, equipped and crewed platform that has SAR as its main responsibility. These vessels are stationed in areas that have a high risk of SAR incidents. Multi-tasked SAR vessels are other Canadian Coast Guard vessels that are tasked to deliver the SAR Program and at least one other operational program. They have to remain within a specific SAR area while they are multi-tasked to the SAR Program and maintain all SAR operational standards. Multi-tasked vessels

increase efficiency and, to some degree, reduce operating costs.

On 28 March, Canadian Coast Guard resources in the Gulf of St-Lawrence area were as follows:

- Two SAR Lifeboats on the south coast of Newfoundland and one on the east coast of Cape Breton;
- Three multi-tasked High Endurance Vessels - two on SAR and Ice Operations (CCGS SIR WILLIAM ALEXANDER and CCGS GEORGE R. PEARKES) and one assigned exclusively to ice operations (CCGS EDWARD CORNWALLIS);
- One Medium Icebreaker (CCGS DES GROSEILLIERS) on Conservation and Protection (Seal Hunt) and SAR; and
- One Heavy Icebreaker (CCGS LOUIS S. ST-LAURENT) on SAR and Ice Operations.

RESCUE CENTRES

The JRCCs/MRSCs are responsible for the planning, co-ordination, conduct and control of SAR operations. JRCCs/MRSCs have highly trained staff, detailed operational plans and an effective technical communications network. Once a JRCC/MRSC is notified that a person(s) is in danger, the SAR Coordinator begins to organize the rescue. All available information about the person(s) in danger is gathered and recorded and the positions of potential assisting resources in the area of the incident are determined. SAR Coordinators are trained to evaluate various situations and send the most effective resources to deal with a particular incident. In complex and major incidents, many resources are often tasked or diverted to assist, with priority given to saving life and limb.

The degree of urgency, the type of emergency, the availability of resources and the location of the incident are all key elements that determine the type of response in a given situation. Some of the most common alerts received from fish harvesters are:

- vessels taking on water, on fire, or running aground and with hull damage;

- medical emergencies;
- person in the water;
- failure to arrive at an intended destination, return to port on time, or generally considered overdue; and,
- other, often preventable, urgent situations, including disorientation, mechanical failure, steering problems, and fuel shortages.

NON-DISTRESS INCIDENTS

Marine incidents are not always life threatening. Each situation must be evaluated carefully and treated differently as there is always the potential that what appears to be a benign event may evolve into a life-threatening situation. Each situation is subject to the judgment of the rescue coordinator. If assistance is required, the following options will be considered:

- ensure that every attempt has been made by the vessel to arrange commercial assistance;
- assist the disabled vessel in arranging commercial assistance;
- if no commercial assistance is available and/or it is determined that an incident is about to develop into a distress situation, a SAR resource will be tasked to assist; and
- if towing assistance is required, the vessel will be towed to the nearest safe haven and released in accordance with the national SAR towing policy/Canadian Coast Guard Fleet Safety Manual.

The National SAR manual has specific comment regarding such non-SAR cases and the potential for towing. Specific extracts include:

ASSISTANCE TO DISABLED/ABANDONED VESSELS
 7.14 Search and rescue units (SRUs) often provide assistance in operations not directly related to a search and rescue (SAR) incident, which if not carried out might result in a definable potential endangerment to life, and/or might result in undue hardship to the interests involved. Examples of the types of assistance provided typically include the provision of aid such as towing, dewatering, firefighting or escort assistance. Subject to

SAR priorities and paragraph 7.15, rescue co-ordination centres/maritime rescue sub-centres should facilitate the participation of SRUs in these types of operations, and assign an appropriate incident classification to the activity.

NOTE: Vessels or other craft abandoned during the course of a SAR incident may require

assistance from SRUs until the owner or other responsible agency assumes control.

7.15 SAR activity taken under the above paragraph shall be in accordance with the Canadian Coast Guard Towing Policy (Annex 7A), when applicable, and in any event shall not be performed in competition with commercial

Overlay of SAR / CCG / Ice Breaking / DFO

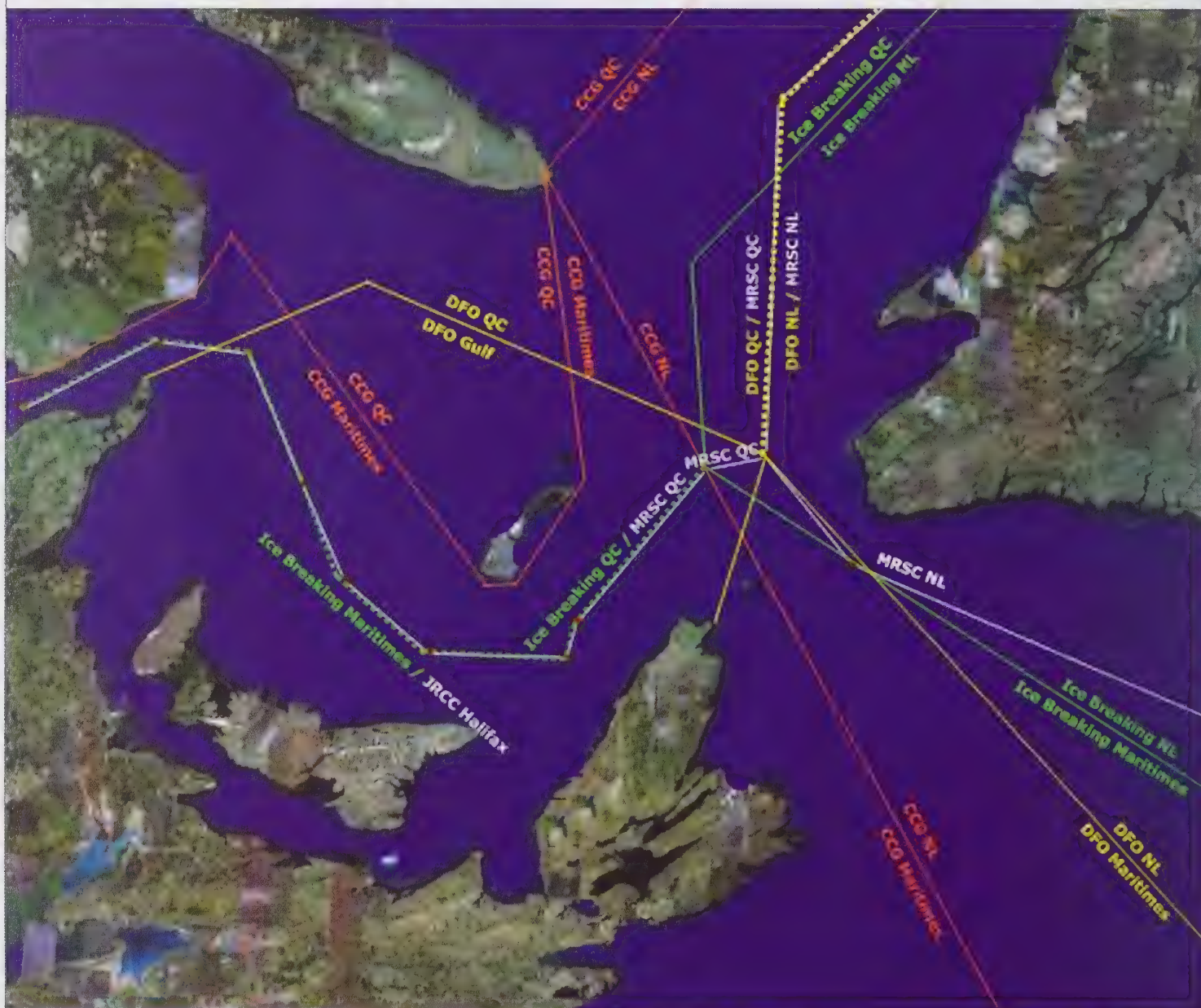


Figure 19: Overlay of Organizational Jurisdictions for Department of Fisheries and Oceans and Canadian Coast Guard Activities

salvage interests. However, it is recognized that many areas of each search and rescue region are remote and isolated and that there are no commercial salvage firms operating within these areas which can or will respond to the incidents.

THE LIMITATIONS OF THE REGIONAL AND ORGANIZATIONAL CONSTRUCT

The functional and spatial, or geographic, boundaries which exist within any organizational structure are inevitably the result of events which have occurred and decisions which have been made in the past. The current construct of the Coast Guard, Department of Fisheries and Oceans and the Federal agencies concerned with maritime affairs in general were largely shaped by the Government reorganizations of the 1990s. The organizational shock of the amalgamation and realignments of that decade have given way to what remains essentially a work in progress, a continued evolution of the multitude of activities and functions in an ongoing rebalancing effort, often in response to ongoing variations in the need for services.

In the context of the organizations which influenced events leading up to the L'ACADIEN II's accident on 29 March and its aftermath, it is clear that many elements and offices, and indeed several departments, had a hand in marshalling information, awareness, communications and decisions. In focusing on the zone in which the events played out, the chart above at Figure 19 is illustrative of the complexity of the organizational model which was charged with overseeing and managing events on that busy night. Though not exhaustive in its representation of agencies involved, the image cannot help but conjure up a sense of misalignment and incoherence. Functional, geographic, natural, political (provincial) and even linguistic dynamics were at play. It must be asked if all concerns were being addressed as efficiently as possible. Certainly, they are not all being dealt with in a holistic and

systemic fashion as a result of a variety of silos which exist.

The zone concept is popular in the east coast context for viewing issues on a larger scale. The reality is that this lens is suitable only for some at the management level, and particularly from the National point of view. Unfortunately, as gleaned through the majority of interviews conducted⁸⁰, it has on the whole failed to permeate the working level of the organization, within individual programs or local offices. Examples related to this incident include confusion in the two Ice Offices in Quebec and Dartmouth as to when and which vessel CCGS DES GROSEILLIERS was providing assistance and a seeming disconnect between icebreaking policy levels of service and priorities as compared to JRCC's categories for describing cases and assigning rescue units.

COMMUNICATIONS & DATA MANAGEMENT

To those engaged in serving Canadians by providing surveillance and situational awareness to the operations centres and units at sea, as well as the managers and decision-makers charged with prioritizing and delivering efficient and effective capabilities, *maritime domain awareness* is a primary objective, long sought but seldom achieved in full. A spectrum of satellite tools, communications equipment, display systems and the talented people to utilize them all to positive effect are required to deliver real-time awareness of events on Canada's oceans. This is an evolving and multi-agency field of endeavour. The current reality falls short of the goal.

Because a common, multi-use display or picture of the data available on the night of the L'ACADIEN II incident was lacking, and the facility to instantaneously share common data did not exist, radio transcripts again and again illustrate confusion and misinterpretation regarding vessels and issues taking place on 28-29 March.

⁸⁰ Interviews with regional office personnel, radio station operators, JRCC, and ship's officers, served to illustrate the limitations of the Zone concept. Many did not perceive their place and role within it and did not feel that they had access to effective communications or information that covered the entire area.

The voyage of the CCGS DES GROSEILLIERS is particularly illustrative of the inadequacies of boundaries, organizations, data display and protocols. Assigned to the seal hunt and reporting to offices ashore in Quebec City, there was no awareness of her presence on the east coast of Cape Breton by some employees of the Sydney Coast Guard Radio, the ROC in Dartmouth or the JRCC in Halifax. Because no live positioning data such as AIS (Automatic Identification System) or satellite positional data are being exploited currently by Coast Guard, CCGS DES GROSEILLIERS “was a mystery” to JRCC just as the SAR scenario was beginning to intensify⁸¹.

The traditional 12-hourly reports⁸² still work their way through the system, but they are neither real-time nor readily available to JRCC or radio station personnel working a dynamic shift. Similarly, the inconsistency of protocols for vessels moving from one area of jurisdiction to another, and the fact that her tasking was related to the seal hunt in the context of a zone assignment⁸³, gave CCGS DES GROSEILLIERS no incentive to advise the local Coast Guard partners of her position and activities. Assumptions, incomplete transfer of information, lack of validation or corroboration, at times because of a lack of digging for the information, all contributed to inadequate understanding of issues at play in this operational area.

It is clear that the issues described above did not cause the L'ACADIEN II's accident, they simply formed the context within which the incident occurred. It is worth considering however that some of these issues could one day become causal in only slightly different circumstances.

MARINE COMMUNICATIONS AND TRAFFIC SERVICES

Marine Communications and Traffic Services (MCTS) is the Branch of the Canadian Coast Guard that provides

communications and vessel traffic services to the sea-going public. MCTS monitors for distress radio signals, provides the communications link between vessels in distress and the JRCC/MRSC, sends safety information, handles public communication and regulates the flow of vessel traffic in some areas. MCTS is an important link in the SAR system.

Beginning on the afternoon of 28 March, Sydney Coast Guard Radio became engaged with the case of L'ACADIEN II. Lack of information and a common operating picture suggests that operators were fundamentally unaware of the movements of the CCGS DES GROSEILLIERS. It appears that an assumption was made that DES GROSEILLIERS was in fact tasked to assist the L'ACADIEN II by Quebec Region, though never verified or corrected. Once in contact with the sealing vessel, Sydney Coast Guard Radio's efforts with the L'ACADIEN II were largely professional and effective. Delays in the dispatch of a Coast Guard vessel in response to the request for assistance from L'ACADIEN II were essentially a result of the initial confusion about the scene being played out on the ice.

It is pertinent to address the issue of language used in the communications between L'ACADIEN II and the agencies ashore. Because events were occurring off Cape Breton, direct radio contact with a Quebec-based Coast Guard Radio station and a link to MRSC Quebec where access to a French-speaking operator was virtually guaranteed was precluded. Instead, the communications fell to the bilingual operators of the Gulf and east coast of Nova Scotia. Upon taking up communications with and acknowledging the needs of L'ACADIEN II, every effort was given by both Sydney Coast Guard Radio and JRCC to deliver the services required. It can be fairly stated that this effort was successful.

⁸¹ As reported by the JRCC Watch Officers.

⁸² These reports offer positional data and activity updates by Coast Guard vessels at sea. They are submitted by FAX across available radio or telephonic frequencies.

⁸³ From the perspective of the conservation effort to which CCGS DES GROSEILLIERS was assigned, the seal hunt was taking place in a singular zone in the Canadian east coast waters off Quebec, Newfoundland and the Maritimes. The means for integrating this zonal activity into the subdivided jurisdictions described in Figure 19 are not well described.

What can be gleaned from various radio recordings is that while the service was at the advertised standard, it was not always equivalent to some of the exchanges engaged in with English-speaking vessel operators in the same area. In essence, issues of context and depth of explanation were either not offered or not as fulsome when engaging with L'ACADIEN II. This likely occurred due to the lack of facility with the language as well as the time and level of effort required which was a challenge for busy communications centres. This had no impact on the services offered, though clearly did contribute to levels of frustration as L'ACADIEN II waited hours for help while not fully understanding why.

TOWING IN THE CANADIAN COAST GUARD

Since 1960, in support of safety of life at sea, the federal government has published policies and procedures for the provision of technical assistance, including towing of disabled vessels, on a limited basis and not in competition with commercial or private interests.

Over time, the documents have been reviewed, amended and published in various formats and publications. The latest renewal was initiated in 2002 following concerns raised by commercial towing and salvage services and at the request of Canadian Coast Guard regional personnel who highlighted deficiencies in the procedures as published in the National SAR Manual (NSM). Consultations and analysis were undertaken to ensure these federal services were provided in a standardized and consistent manner across the country. Further, the principle that "federal assistance to disabled vessels which are in no immediate danger only be provided as a last resort in situations when commercial or private assistance is not available", was reaffirmed.

In 2004, the Canadian Coast Guard Management Board approved renewed procedures for the provision of assistance to disabled vessels by the federal government or its agents such as the Coast

Guard Auxiliary⁸⁴. These procedures came into force Monday 3 May 2004.

To facilitate the implementation of these renewed procedures, communications plans were put in place targeting owners and operators of vessels which could potentially request towing assistance. While these renewed procedures provide guidance for sound and transparent management and decision making on what the Canadian Coast Guard and its Rescue Centres will do and when it will do it, they remain very high level and do not include specific steps or guidelines on *how* to deliver the service at the ship level. Such information should include the minimum controls, capabilities and requirements and provide guidance to the persons involved in the operation. Despite this renewed policy, the consistency of application between Regions and at different Centres was not apparent through the interviews conducted for this investigation.

The CCGS SIR WILLIAM ALEXANDER arrived on scene to assist the L'ACADIEN II with a crew of 27 aboard. Typical of the Coast Guard fleet today, this is a vessel in the latter half of its service life. Manned by an experienced crew, they are knowledgeable and trained across a spectrum of skills but particularly buoy work, ice operations and SAR. Towing in ice tend to exist at the lower end of the proficiency spectrum since conducted less frequently. Though all crewmember aboard had participated in towing vessels to varying degrees, towing in ice was not the ice breaker's forté in either skill or equipment. What is certain is that towing for the Coast Guard often occurs in less than benign circumstances, as was the case on 28 March.

5.3 FURTHER POTENTIAL MITIGATIONS TO RISK IN THE L'ACADIEN II SCENARIO

In hearing testimony regarding the range of considerations, decisions and actions at play on

⁸⁴ The Coast Guard Auxiliary is a volunteer organization made up of boaters, sailors, yachtsmen and fishermen. They serve as eyes and ears on the water and often engage in assisting vessels that are broken down or in distress. The assistance offered by Auxiliary members is always subject to their skills and capacity, and the prevalent conditions.

the night of the incident and comparing them to reference materials, manuals and the observations of subject matter experts through consultation, it is inevitable that 20-20 hindsight should deliver certain potential mitigations which were not employed or deployed. Three such potential courses, not discussed in the paragraphs above are worth discussion:

ON-SCENE COMMUNICATIONS

It is evident from the recordings that the plan for effecting the rendezvous with the L'ACADIEN II and the method for passing of the tow was discussed and understood⁸⁵, with VHF radio communications serving as the means. It is also clear that the standing liability waiver was read to the stricken vessel and acknowledged. What is not clear is whether this latter to the master of L'ACADIEN II or was seen more as standard procedure⁸⁶. Its value of the liability waiver in enhancing the safety of the tow is certainly questionable⁸⁷.

A better approach might have included a more fulsome discussion of the actual risks of the tow, including the issues of ice, the disparity in the size of the vessels and the potential, though remote, of girding. Clarity over the condition of the helm and the engines may also have been important. It is uncertain whether a better understanding of the evolution and its risks would have resulted in any changes in the actions of the crew of the L'ACADIEN II or their survivability. However, more fulsome conversation In a similar fashion, the internal communications aboard the CCGS SIR WILLIAM ALEXANDER, and particularly that of the towing watch, should have included reports on those moments when the towing watch almost chose to employ the axe, if only as a means of highlighting the degree of concern for all involved. All participants had a role in possibly using more pro-active communications than was the case that night.

USE OF DROGUES

Towed vessels often fall into a cyclic pattern of yawing from port to starboard while underway, with speed and hull-form being contributing factors. Manoeuvres, speed changes and obstructions, such as ice, interrupt these patterns and impart their own forces. A towing bridle, with points made fast on each bow of the towed vessel, are designed to counter this movement as the outboard bridle comes under increasingly greater strain the greater the yaw, imparting a corrective movement back towards the centre-line. Notwithstanding the slow speed of the tow, all witnesses noted at least some degree of yaw being experienced along the towed track of the L'ACADIEN II, with resultant concerns by some of the towing watch and observers in MADELINOT WAR LORD for how she was rubbing the ice boundary on either side of the track.

The use of a drogue, towed astern of the L'ACADIEN II, might have significantly dampened this movement and prevented the particular yaw or sheer to port which resulted in the collision with the ice. A reasonably specialized piece of equipment, it would have to be sturdy and equipped with a down-rigger, such as used for west coast salmon trolling, to make it effective and durable in the application in sea ice. It should be noted that such an appendage is viewed as counter-intuitive, even unnatural, to many accustomed to working in ice, as the theory suggests that gear which can be caught up in the ice and its dragging effects is to be avoided. Even if considered on the night of the 28 March as the towing gear was being prepared, the lack of a specific drogue on board would have required a jury-rig or ad hoc arrangement which, though potentially effective for a short period of time, would have had questionable sustainability in the conditions at play.

⁸⁵ A standard form required by Coast Guard policy, it is either delivered and signed by the master of the towed vessel or, more commonly, transmitted by radio and acknowledged.

⁸⁶ Witnesses from the wheelhouse of the L'ACADIEN II recall the master commenting that he had no choice but to accept the terms of the waiver if he was to receive the assistance he required.

⁸⁷ The form speaks of issues of responsibility and liability, not of the conduct of seamanship or details of the risks.

ASTERN MOVEMENT AT IDLE SPEED

In the absence of a drogue, use of the L'ACADIEN II's engine at a steady astern setting, at just above idle speed, might have made for an adequate alternative for managing the movement of the towed vessel. The key would have been to use consistent RPM at a low setting to avoid imparting any influence on the heading of the vessel with the propeller and, at the same time, preclude the placement of excessive strain on the towing hawser. This arrangement could have imparted a similar dampening effect on the tow as conveyed by a drogue, mitigating the extent of any yaw experienced. Concerns over engine cooling or potential over-heating of the clutch or gearbox arrangement would have to be taken into account, and might have limited the effectiveness and duration of this technique. Taken at face value, none of these three elements - on scene communications, use of drogues and astern movement at idle speed - represent a profound change for the conduct of the towing evolution, nor do they offer guarantees to the success of a risky operation. They serve only as an additional potential means of reducing the risks, exactly what mitigation is supposed to offer.

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5.4 REFLECTIONS ON THE ANALYSIS

The analysis of systemic factors above can only touch on a portion of a range of large scale and complex issues which the Coast Guard can consider in seeking to improve the safety and service on Canadian waters. More important in this report, and more meaningful for those involved, including survivors of the L'ACADIEN II, families of the deceased, and the crew of the CCGS SIR WILLIAM ALEXANDER, are the assessments of the decisions and actions on the night of the tragedy.

Was there risk taken? Yes, there was risk as there always is at sea, from the moment the L'ACADIEN II left her berth in Cap Aux Meules and made way into the ice, through to the point where the three ships entered open water at 01:00 on the morning of 29 March. Had this type of risk been taken before? Unquestionably, in some form or another, by some of the people involved in this incident, but certainly not by all.

Was it reasonable for a Coast Guard icebreaker to take this comparatively small fishing vessel under tow? This is perhaps the most essential question and is shaped by the forecast of 28 March and the potential risks of leaving the sealing vessel to the elements. Yes, given that such a tow had been conducted successfully on a number of occasions previously, that there were no commercial vessels available, nor were there vessels nearby of a dimension similar to L'ACADIEN II with the capability to take on the role of a towing vessel. Circumstances will almost unquestionably demand it be done again, hopefully with a different approach as a result of the lessons learned from this accident.

Was there a possibility of disaster at the outset of the tow? Undoubtedly, but possibility should not be confused with probability. Judgement, mitigation and effective conduct all form part of the equation, as do the small errors, momentary hesitations and unforeseen elements that often align in accidents, particularly in hindsight. Despite the possibility of disaster, two and a half hours of a successful towing evolution through ice, challenging and stressful as it was, seems to suggest that there was in fact a possibility if not a probability of success, were it not for an unintended sheer to port at the very instant a dangerous ice remnant lay in the path of L'ACADIEN II.

CHAPTER 6 – OBSERVATIONS AND RECOMMENDATIONS

The preceding sections of this report have delivered context, detail and analysis of the events which frame the capsizing of L'ACADIEN II. The intent in the following paragraphs is to briefly touch again on the key concerns raised above and to describe the specific recommendations worth considering in the aftermath of the events of 28/29 March. The recommendations are arranged in three sections: those related to the conduct of the tow on the night of 28/29 March and the policies related to towing; organizational issues; and, thirdly, issues which fall outside the domain described by the Terms of Reference for this report but are worthy of further consideration by Coast Guard.

6.1 CONDUCT OF THE TOW AND COAST GUARD TOWING POLICY

Let there be no doubt, the Coast Guard will tow. That the organizations' confidence has been shaken as a result of the L'ACADIEN II incident is understood, but the vagaries of life at sea suggest that towing a small vessel, and in ice, remain a possibility. A clear, firm and concise towing policy is required. This should be augmented by a detailed and consistent guide to operators. As a complimentary effort, an assessment of the skills, training and equipment which is in place, and perceived to be required for future operations, should be undertaken. The capability of the Coast Guard's seagoing community to conduct a tow is not fundamentally in doubt. Rather, the guidance, expectations and policy language, from management, through to emergency managers and the crew is currently inconsistent.

The following recommendation results:

1. The Coast Guard should conduct a full review of towing requirements, policies, processes, training and equipment. The following areas should be addressed:

- a. Development, delivery and monitoring of a singular towing policy, across the Coast Guard,

with linkages to the range of applicable reference material and pertinent documentation. These material should include such key guiding publications as the SAR Secretariat's manual, which describes expectations for response in SAR, humanitarian assistance (HA) and non-SAR/HA situations;

- b. Development of clear seamanship procedures, standards and techniques required for a towing scenario, while leaving room for the deviations forced upon operators by the conditions at the scene, as judged by the on-scene commander. For example, for the towing of small vessels by large Coast Guard platforms, such as was required in the case of L'ACADIEN II, the *default* guidance should be to require the towed vessel to reduce the number of crew onboard to the absolute minimum which still allows the towing evolution to be conducted safely. This would serve to take into account the significant risks at play with such hull/power disparities. Such defaults can never become black and white absolutes, but serve as a means of highlighting concerns, of enabling the conversation between mariners, and to facilitate cooperation so as to mitigate risk. While the guidance and the defaults must be clear, the conditions at hand must always be allowed to shape judgment and actions;
- c. A review, in consultation with stakeholders, of the training, technology, equipment and fittings available and pertinent for future operations should be conducted. Implicit in this effort should be an assessment of the effectiveness of recent or emergent technologies such as the tensionometer, slack-hook arrangements and quick-release mechanisms. In turn, contribution to the development of modern, consistent and broadly held manuals and check-lists is in order;
- d. As a continuation of the work performed by the naval architect, a research and development effort through naval architectural calculations, water-tank tests and live trials to establish and

better understand the where and the why of safe operating limits in a towing environment, with and without an ice dynamic, is in order. This body of knowledge should better describe the margins of safe operating procedures than as compared to the literature and professional knowledge base today. Of particular interest will be the consequences of disparate vessel sizes in towing operations. This should offer operators a better appreciation of where the risks begin to escalate, along with the potential means for mitigating specific dangers; and,

- e. Until the above efforts are ready for implementation, the establishment of an interim policy for towing and support of the sealing fleet should be formed and announced prior to the 2009 hunt.

6.2 ORGANIZATIONAL ISSUES

Four key topics require consideration in developing the recommendations related to the organizational elements of this incident worth learning from. They include:

- the methods, technologies and protocols for communications and situational awareness;
- the jurisdictional construct;
- the organization's capacity to deliver a relatively detailed inter-disciplinary process for risk-management based resource allocations, including pre-positioning of SAR assets for the fisheries; and
- organizational learning;

The following recommendations result:

2. Coast Guard should aggressively seek, implement and apply technological methods which deliver a "common operating picture."

The Department of Fisheries and Oceans writ large and the Canadian Coast Guard in particular, highly tasked and resource limited, can no longer afford for units at sea, emergency operators or key resource managers to be largely unaware of the details of the

shipping they are expected to oversee and protect, let alone remain uninformed of the real-time positioning of their own Federal assets. A real-time common operating picture, exploitive of AIS (Automated Information System) and satellite technology, with embedded geomatics and climatological data, that enhances situational awareness and effective decision-making, is in order as soon as is feasibly possible;

3. Coast Guard should conduct a reassessment of its east coast waters' jurisdictional apportionment.

Described by some within the organization as Byzantine, an effects-based re-calculation and re-alignment of the layered boundaries present in the Quebec/Maritimes /Newfoundland geographic area should be urgently undertaken. While remaining cognizant of the many factors, from geographic to political to historic that are indeed relevant within this domain, a clear emphasis of priority on clients, safety and sea mobility would serve to define a more coherent, more effective construct than that which is extant. Given whatever construct which is arrived at, a clear set of protocols for information exchange, operational overlap, clarity of authority and of responsibility should be initiated in turn. Mechanisms for the identification and announcement of movements of individual vessels through the range of jurisdictional domain, whether geographic or functional, are in need of establishment.

4. Coast Guard should refine its organizational planning and risk management process for the oversight of east coast activities.

Evident from the discussions with regional staffs and a comparison of the planning processes utilized, it is time to consider development of a more dynamic and inclusive inter-disciplinary risk assessment, planning and decision-making processes. This could extend awareness, manage changing conditions and balance appropriate, or indeed limited, asset availability. In concert with the boundary re-alignments called for in recommendation 3, a review of the functional (engineering, ice, SAR) and operational (ships, sea days, communications) capacity to consider (plan,

manage, predict) the regional demands should evolve to include cross-discipline participation within each HQ, and better interface with other HQs and National organization. It should be motivated by the desire to deliver a higher level of considered pro-active intervention or reactive capabilities, as opposed to the often reflexive and largely specialized or stove-piped processes which are currently apparent.

The full spectrum of involved agencies, from management, to operations centres, to JRCC, to Engineering - and inclusive of stakeholder groups when appropriate - should be considered as partners in the processes of plan development, contingency consideration, risk event pre-positioning, on through live issue management. An appropriate flexible model could be utilized at four levels; local, regional, zonal and National, adapted to the perspectives of each level and the demands of each situation.

5. Coast Guard should promote the concept of record-keeping and analysis, as well as the value of shared professional lessons learned.

Not embodied within the context of the incident but a feature perceived through the investigation process, it is noted that the capacity for record-keeping, incident analysis and the broad sharing of lessons learned is, on the whole, not yet a broad cultural reality within the Coast Guard. Though digital audio and video recorders are ubiquitous in Canadian society and business, their presence at sea within the Coast Guard is inconsistent and their formal and mandated use is not espoused in any constant policy. The dossier of missed opportunities that this represents for incident reconstruction, analysis and lessons learned is immense. The capturing of these analyses, the sharing of lessons learned and a compilation of a reference database appears lacking as a professional tool.

Inculcation within the culture of Coast Guard of the importance of record-keeping, using modern tools such as video and audio recording devices, subsequent analysis and professional dialogue should be a conscious change agenda issue. Enhancing the process of lessons learned and of

promoting the dialogue around unique successes, near misses and events gone wrong is the sign of a healthy organization which is cognizant of the risk environment within which it must operate, every day of the year. The value of systemizing a process by which each individual is not required to personally make each of the thousands of possible mistakes to learn from its lessons cannot be overstated.

6.3 CONSIDERATIONS BEYOND THE TERMS OF REFERENCE AND BEYOND COAST GUARD AUTHORITY

This segment of the recommendations touches on areas not explicitly called for by the TORs but considered worthy of mention in the final report. The Canadian Coast Guard is a civilian Special Operating Agency within the Department of Fisheries and Oceans. Its structure, authorities and responsibilities have been evolving since the middle of the 1990's. In assessing the larger scope of factors which were in play during the L'ACADIEN II incident, it is evident that some issues for which the Coast Guard was responsible that night do not reside within their domain of authority to adjust or resolve. Of the three recommendations which follow, one represents an area where the Coast Guard is able to act within its mandate. Two represent issues with clear implications for Coast Guard responsibilities and resources, but which fall outside of the Coast Guard's authorities and within those of other Federal agencies.

The following recommendations result:

6. Coast Guard should renew and reinvigorate engagement of the client base.

Coast Guard should engage the spectrum of customers affiliated with the eastern Canadian littoral, focusing on two key goals: to educate the public and commercial domain on the current roles, capabilities and limitations of the Federal fleet and to derive an understanding of trends and expectations as seen from the perspective of this customer base. Topics for engagement include;

- a. The state of the fleet and other Coast Guard assets and plans for future construction;
- b. The policies in place and the real-world constraints on the delivery of assistance in SAR and non-SAR situations, including risk issues, seamanship, equipment and communications;
- c. The interface between Coast Guard and the various enterprises on the waterways, from the pleasure boater through the fisheries and over to the large commercial fleets. This effort would include the aim of achieving an ameliorated degree of mutual understanding, of alignment of jargon, terminology and technical language not evident today;
- d. A special emphasis on ice operations, Coast Guard support and expectations. As well, consideration should be given to the realities of how the spectrum of Federal agencies, from climatologists to conservation teams through to the SAR Secretariat, can provide assistance to those on the ice conducting their legal enterprises in a more coherent fashion than is being delivered today.

7. Coast Guard should propose and participate in a coherent alignment of cross-Departmental jurisdictional domains within Canada's east coast waters.

A corollary of Recommendation 3, above, this recommendation serves to acknowledge that Coast Guard does not operate in isolation and that other agencies have interests and authorities within the greater region in question. To be effective, any effort at realignment must be cognizant of these other domains and seek to initiate the refinement of boundaries on that larger scale. Liaison with external partners should be initiated so as to generate the appropriate motivation and cooperation.

8. Coast Guard should propose a review of the regulatory process, standards and inspection regime for vessels working and operating in ice with the applicable authoritative partners in the appropriate Departments.

It can be fairly said that this issue was unanimously commented upon. Seamen, sea-going officers, sealers, towing professionals and staff all viewed this area as a significant vulnerability for safety at sea. While the regulatory responsibilities reside outside of the Coast Guard's authority, largely within the domains of another department, Transport Canada and other sectors in the Department of Fisheries and Oceans, the level of concern and strong advice received in conversation with witnesses demanded that the topic be addressed in this report.

As noted, Coast Guard should endeavour to initiate a review process of the participation and practice of ice navigation. This effort should include the full spectrum of ice operating vessels and consider the methods by which Coast Guard has in recent years been successful, or unable, to influence norms and practices overseen by other agencies and departments, in essence giving light to any responsibility/authority mismatch.

Of particular interest is the potential development of a sliding scale for access to the ice, for whatever type of vessel or activity, founded on actual ice conditions, suggesting that size or robustness of a platform should be consciously matched to conditions in

affording access to the challenges, risks and dangers of working the ice. This is not dissimilar to the current ice regime utilized in the Arctic. Safety and environmental issues can form part of the calculations, as should commercial requirements, species quotas and licensing. Stakeholder engagement for this undertaking is vital, while their full concurrence, particularly on matters of compulsory safety standards, is not.

CLOSING COMMENTARY

With the impact of fatalities as a result of the L'ACADIEN II incident, many organizations would be tempted to rein in their operations measurably and permanently. This is not the lesson to be gleaned here. The Coast Guard remains a capable and necessary organization devoted to service and safety on the Nation's sea approaches, harbours and waterways. This incident should stimulate a forthright review of policies, training and equipment for towing and for ice operations, as described in the recommendations above.

The latter domain, that of operating in ice, represents a particularly unique area of risk management from which Federal maritime agencies cannot afford to recoil. The volatility of climate activity has made predictability of ice conditions and weather patterns a science trending towards increasingly surprising scenarios. The growing focus on Arctic resources, with or without an ice-clear Northwest Passage, describes a National imperative to improve presence, capabilities and skills. This tragedy is a signal opportunity, the potential source of motivation for achieving that National imperative. Striving for that goal is the means by which we might pay homage to those lost aboard L'ACADIEN II.

Signed December 1st, 2008

Roger Girouard, Rear Admiral (Ret'd)

ANNEX A – TERMS OF REFERENCE & CONDUCT OF THE INVESTIGATION

A.1 TERMS OF REFERENCE

The Terms of Reference (ToRs) for this independent internal investigation were conveyed on 4 April 2008, with a subsequent clarification delivered on 14 April. The ToRs required an independent and unbiased assessment and review of the circumstances leading to and following the capsizing of L'ACADIEN II. The key areas for determination and assessment in the ToRs were:

- the sequence of events that led to and followed the occurrence;
 - how the incident occurred, why the incident occurred;
 - whether there was compliance with: Canadian Coast Guard (CCG) policies, procedures and work practices including the CCG Towing Policy; general practices for non-Search and Rescue (SAR) assistance to vessels; the common practices of good seamanship; and regulatory and industry standards; and
 - any other matters related to the occurrence that were deemed necessary and relevant to ensuring a full and clear understanding of the occurrence.
- In addition to ascertaining the course of the events surrounding the incident, the goals of the investigation were related to making preventative safety-oriented recommendations so as to preclude, to the degree possible, such a tragedy from occurring again. Neither direct blame nor implicit responsibilities were sought by the process.

The presence of shared interests and parallel investigations was acknowledged in the ToRs, most notably those of the Transportation Safety Board of Canada (TSB) and of the Royal Canadian Mounted Police (RCMP). Each was mandated and defined by specific Canadian legislation with the former being provided specific exclusivity in law, in this case the Canadian Transportation Accident Investigation and

Safety Board Act, establishing that TSB alone was authorized to make specific findings as to causes and contributing factors of an occurrence. The clarification to this investigation's ToRs was meant to ensure the investigation team was fully cognizant of both the range and the limitations of their mandate.

Though not stated explicitly in the mandate of the ToRs, it is important to acknowledge that the Commissioner's verbal directives included specific guidance as to prioritizing the conduct of the investigation. In gauging the spectrum of approach for the coming effort, that being from expeditious and efficient through to complete and exhaustive, it was determined that while a timely explanation of the circumstances was a desirable, the imperative was to do a thorough and complete examination of all the pertinent factors so as to enhance the validity of the report and the attendant lesson and recommendations. In short, the guidance affirmed that when in doubt, the investigation team would attempt to dig deeper.

A.2 ENGAGING THE SURVIVORS AND THE FAMILIES OF THE VICTIMS

After coming together and building an initial work plan in Ottawa, the initial trip of the core investigation team was to the Magdalen Islands to embark on their investigation with the two survivors and key witnesses and to initiate a relationship with the families of the victims. Viewed as key stakeholders in the process, it was determined that informing the families of the investigation team's mandate and progress was a prime deliverable. Reaching out in this fashion opened the door to the next key possibility, the inclusion of the families' expectations and questions early on in the fact-gathering stage of the investigation. This helped provide an important lens for the team by which to view questions and scrutinize events, as well as perspective for their analysis. A follow-up visit in June to offer a mid-way update was profoundly useful in confirming the thoroughness of the investigation and in allowing follow-up issues to be identified before completion of the report. Again, the commitment to the families of a briefing on the final commentary, observations and recommendations was important to the overall success of the investigation process.

A.3 THE INVESTIGATION TEAM

The Commissioner of the Coast Guard determined that while an internal investigation into the capsizing of L'ACADIEN II was required, the nature of the tragedy and the involvement of the Coast Guard's leadership team in managing the event might preclude the required perception of independence and fairness should he select a senior Coast Guard officer to lead the investigation. To guarantee himself of an unbiased arm's length perspective, a mariner's viewpoint and a capacity to assess systemic factors, he chose to approach the Canadian Navy for assistance in finding a suitable investigator. Subsequent deliberations resulted in the Commissioner appointing Rear Admiral Roger Girouard (Ret'd), the recent Commander of Maritime Forces Pacific and the Regional Search and Rescue (SAR) Commander for British Columbia and the Yukon, as the head of the internal investigation.

In turn, and in an effort to keep the investigation effort agile and efficient, the core investigation team was limited to two other individuals. This included Mario Pelletier, a senior Coast Guard officer with an engineering and seagoing background, currently serving in Coast Guard Headquarters, as well as Captain Sylvain Bertrand a seagoing Coast Guard officer based in Quebec Region, currently serving as Commanding Officer of the CCGS DES GROSEILLIERS, though not at sea and engaged with the events pertaining to the incident. Both were invaluable in helping to address the lead investigator's questions and queries in a timely and productive manner. They assisted in the witness interview process and were participants in the assessment and analysis portion of the investigation. Their conduct was impartial and professional throughout.

Additional regional or technical expertise and assistance was occasionally required by the inquiry team, apart from that sought out for testimony for inclusion in the review process. This was provided by Captian Tony Kasprzak, Superintendent, Fleet Safety and Security, of the Coast Guard's Maritime Region Offices, and Paul Rudden, the Maritime SAR Coordinator at the Joint Rescue Coordination Centre in Halifax. Each brought specific niche expertise from the Regional or Search and Rescue communities.

A.4 RELATIONSHIP WITH TSB, RCMP AND SAR COMMUNITY

The reality of concurrent and parallel investigations is familiar to Canadians today. The case of L'ACADIEN II was equally subject to this approach due to the nature of the tragedy and the emergence of particular jurisdictions as a result of specific Laws and Acts. This investigative environment put certain delimitations, or boundaries, on the Coast Guard internal investigation. This had the effect of making the team cognizant and respectful of the perspectives and jurisdictions at play, including certain exclusive roles in terms of arriving at specific causal findings. Though remaining respectful of these zones of mandate or authority, the team was never constrained from addressing any pertinent subject matter or issue as a result, apart from the aspect of the manner in which findings have been dealt with in this report.

The TSB response to the L'ACADIEN II incident was mandated and immediate. As noted above in the discussion of the ToRs, Canadian legislation limits the purview of findings related to contributing and causal factors in maritime accidents to the Board and their investigations. In a practical sense, this did not preclude the Coast Guard's internal investigation from considering or assessing these domains nor from arriving at pertinent recommendations to improve operational protocols or processes as a result. The impact of the TSB mandate resulted only in precluding the team from making direct comment on causal factors or delivering findings as such in this report. In fact, the two teams met early in the process to reassure themselves and each other of the desire to avoid mutual interference, while establishing a cooperative and collegial dialogue. The appointment of RAdm Girouard (Ret'd) as the Minister's Observer for the Department of Fisheries and Oceans facilitated this interchange and cooperation. At the same time, it must be clearly noted that all privacy restrictions to which the TSB investigators are subject were upheld, that is to say that while technical findings and general impressions and assessments were discussed and shared, at no time were transcripts, testimonies or particular individual declarations revealed to the Admiral, as such exchanges are precluded by the Act. Don Eaves, the TSB lead for the L'ACADIEN II

investigation based in Dartmouth NS, adhered to the appropriate measure of confidentiality, as determined in law. In the end, the capacity to share points of view and assessments was invaluable to this investigation, and the sense of the team is that it served the TSB aims as well. Each encounter expanded the details, perspectives and understandings available to both groups, served to corroborate and add confidence to calculations and outcomes arrived at independently, sometimes from different directions.

A second parallel investigation at hand was being conducted by the RCMP. As agents for the Nova Scotia Medical Examiner, the agency with jurisdiction over determination of the cause of death for the three recovered victims, the RCMP serves to gather the information required to conclude the Medical Examiner's report. A distinctly separate and somewhat more nuanced aspect of RCMP involvement existed in the form of potential criminal investigation should illegal activity or criminal negligence have been determined to have formed part of the incident scenario. It should be noted as well that with the one crew member remained un-located in the afternoon of 29 March, and was presumed drowned, standing policy was invoked as the Joint Rescue Coordination Centre (JRCC) in Halifax passed the case to the Nova Scotia RCMP as a missing persons file. While no data or testimony was delivered to the RCMP nor expected by their investigators, it was clear to the Coast Guard team that any declared or inadvertent testimony which might point to the criminal spectrum would have to be reported, even if this meant putting the safety-related aspect of their work in abeyance. This threshold was never crossed and indeed, once the team had amassed a reasonably coherent picture of the event as a whole, the RCMP Major Crime Unit lead investigator, Patrick Murphy, was advised of the team's assessment that no criminal characteristics were evident in any of the testimonies or data. It should be noted that the ongoing nature of the RCMP investigation in concert with the potential for communication between the RCMP and the Coast Guard team gave rise to concerns over self-incrimination by the officers and advice from their legal representation to delay their testimony until the RCMP had declared their work officially concluded. This injected an understandable if unfortunate delay in

the interview process. While inconvenient, the delay was not pertinent to the overall investigation or in arriving at the assessments or recommendations.

Another somewhat less evident review activity was conducted by the staff of the Joint Rescue Coordination Centre itself. As mandated by the SAR Secretariat, a review of any major SAR activity or event is conducted to assess the conduct of the event with an aim to constantly improving the overall SAR team's coordination of what are invariably complex events. Paul Rudden of the Halifax JRCC was the author of this project on behalf of the inter-agency Coast Guard/Canadian Air Force centre. His participation in interviews, tours and a range of the post-event analysis was seen as invaluable, serving both his SAR Secretariat mandate and adding to the perspective of the Coast Guard internal investigation.

While the lay observer might wonder at or even object to the aspect of multiple avenue investigations for a single incident as described above, what is discussed is not a case of absolute and constant duplications, but rather a range of independent looks with appropriate and valuable overlaps. They represent reasonably efficient and often mandated multi-track process to assure that the system arrives at a quality set of findings and recommendations. The lenses in use were different, often rooted in organizational culture, and sometimes unique. Each imparted value to the overall understanding of this tragic accident. The attendant comparing of notes was professional and discrete; where precluded in law, it simply did not occur. The investigations retained their independence and adhered to their mandates while sustaining collegial and productive interchange. In the end, a better product has likely resulted as compared to that which might have been delivered by a single agency alone.

ANNEX B – REFERENCES

HARD COPY REFERENCES

Canadian Coast Guard Fleet Safety and Security Manual
 Canadian Coast Guard Fleet Circular 07- 2008 - Suspension of Towing of Small Vessels with Persons Onboard While in Ice
 Canadian Coast Guard Ice Navigation in Canadian Waters
 Canadian Coast Guard Training Standard for Ship's Officers and Crew
 Canadian Coast Guard Ship's Crew OJT Manual
 National SAR Manual (Department of National Defense)
 SAR Seamanship Manual (Canadian Coast Guard)
 Winter Navigation on the River and Gulf of St. Lawrence (Transport Canada)
 United States National Search and Rescue Supplement
 Marine Towing in Ice Covered Waters
 Modern Towing
 Safety Of Life At Sea (International Maritime Organization)
 International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual Vol. III
 Bridge Resource Management - Training Objectives (Canadian Coast Guard)
 Canadian Coast Guard Command Operations Module
 Fatigue Management - A Guide for Canadian Coast Guard Managers, Officers and Crew
 Avoiding Human Error Among SAR personnel (International Maritime Organization)
 Bridge Resource Management - Team Resource Management - Checklist
 Operational Risk management - The GAR Model
 SAR Mobile Facilities - On Scene Commander Course (Canadian Coast Guard)
 Canadian Coast Guard Rigid Hull Inflatable Operators Training
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 Marine Investigation Report - ICE DAMAGE AND SUBSEQUENT SINKING FISHING VESSEL JUSTIN MOFF THE MAGDALEN ISLANDS, QUEBEC 29 MARCH 2005 (Transportation Safety Board)
 Marine Investigation Report - Sinking of the fishing vessel Gilbert D off Îles de la Madeleine, Quebec, on 16 March 1997 (Transportation Safety Board)
 Canadian Coast Guard Investigation of the Loss of the F/V Angela and Brothers
 Search and Rescue Operations Report F/V L'Acadien II – Case H2008-00319 March 28th/29th, 2008 (Department of National Defense)
 Rapport d'analyse de conditions de naufrage (Canadian Coast Guard)
 National Transportation Safety Board investigation report - Capsizing of Questar Motorboat and Drowning of Operator South of Shelter Island Near Juneau, Alaska - August 21, 1994

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ANNEX C – METHODOLOGY & SEQUENCE OF THE INVESTIGATION

Upon forming, the investigation team had immediate access to the public domain reports of the L'ACADIEN II incident as well as a cursory compilation of key events as compiled by Coast Guard staff based at the Regional Office in Dartmouth. A review of this material allowed the team to lay out a plan for the investigation and begin the process of determining the course of the analysis that would be required. It was clear that a coherent sequence to the initial data-gathering phase was desirable but that external factors such as witness availability would necessitate an adaptable process. Similarly, it was recognized early on that while the initial course of action for the team was apparent based on information available at the outset, new information, calculations and analysis would serve to steer and prioritize efforts along the way. Thus, while a logic flow for the investigation was established, an iterative and adaptive approach was sustained.

The first step of the investigation team was to collect general data which included the compilation of transcripts, operational documents and reports and a witness interview segment. Development of a detailed chronological timeline and sequence of events was developed next (Annex E). This baseline served as the core method for building an understanding of not only what happened when, but helped arrive at how and why certain decisions were arrived at. Concurrent with the construction of the timeline, a literature review was effected to cover a breadth of topics including operational, safety and organizational policies and directives, case studies, reference materials, environmental commentary related to working in ice, seamanship references and dissertations on towing and ice conditions, etc. A listing of the reference material, data and sources utilized is provided at Annex B.

Subject matter experts were consulted to discuss management, safety, ice operations and towing operations. While the consultative interviews which were conducted engaged Coast Guard personnel in

the main, the linkages established with Quebec, Maritimes and Newfoundland Region ensured that a breadth of experience and perspective was considered. This range of Coast Guard perspectives was in turn augmented by referring to outside civilian and commercial agencies. Similarly, in considering the review of publications, references, techniques or case studies, a full spectrum of data was sought, including Canadian Navy, US Coast Guard, British Admiralty and civilian/commercial enterprises.

The investigation's analysis phase included the review of transcripts, reports, organizational policies, case studies and other pertinent reference material. Similarly, scrutiny was given to the various testimony transcripts and notes related to survivors, witnesses and participants, including those involved in the actual conduct of the operation as well as the supporting elements in establishments and sites ashore. An examination of the ship handling, seamanship, decision-making and reasoning was carried out. This resulted in the inquiry team making some comparative analyses and judgmental assessments of the evolutions related to the incident. The goal throughout was to establish an understanding of the safe practice of seamen as it applies to the L'ACADIEN II scenario and to consider if the actual course of events fell within that spectrum. From the above process, the team was then able to turn to the development of conclusions and highlight issues of concern worthy of recommendations with an aim to bettering the conduct of operations.

After initial on-line and telephone exchanges, the investigation team began its work in earnest on 14 April. An initial visit to the Magdalen Islands allowed the team to interview the survivors, witnesses and stakeholders from that community. As well, this allowed for the initial contact with the families of the victims. This was meant not only to advise of the intent, approach and timelines of the investigation team but to absorb the key points and questions raised by the families so as to entrench these into the investigation process with the aim of better serving their expectations.

A visit to Sydney, Cape Breton, afforded access to the crew of the CCGS SIR WILLIAM ALEXANDER and enabled the conduct of interviews with the seamen. This led to a tour the ship, inspection of equipment and a review of the layout of the towing gear with those who had conducted the tow. Sessions with the Coast Guard Radio Station personnel afforded interviews with those who had been on watch in the period leading up to and during the incident. A visit to the Coast Guard College allowed the team to explore policies and course curricula.

Subsequent tours in Halifax and Dartmouth afforded visits and testimony from JRCC personnel, the Staff of the Regional Operations Centre, the Ice Office and the Maritimes Region Headquarters. A review of documentation and transcripts from the offices was conducted. A trip to CFB GREENWOOD, NS allowed interviews of the dive supervisors of each of the two SAR dive teams engaged in the recovery of remains. A key interview with the seaman manning the after towing arrangements at the time of the accident was conducted.

After a careful review of all the materials, towing trials were decided upon and conducted, as well as a material analysis of the towing hawser. Some analysis work was assigned to a naval architect firm to deliver figures related to stability and the potential forces required to cause the capsize of a vessel such as L'ACADIEN II. A range of four analytical scenarios were developed by a naval architect and considered in assessing the physics of the event. To seek specific and unique practical expertise, as well as expand the effort of comparative analysis, the investigation team consulted with a professional towing enterprise to capture perspectives and understandings not generally found in the broader seafaring community. In Quebec City, the team visited Regional offices, the Operations Centre and had discussions with senior staff to compare organizational and management approaches. Crewmembers of the CCGS DES GROSEILLIERS involved in the preliminary stages of the L'ACADIEN II incident, including one of the two engineers who boarded the vessel and inspected the steering arrangement, were interviewed.

A key element of the investigation process was tied to interviews with the three officers in the CCGS SIR WILLIAM ALEXANDER who played major roles in decision-making, overseeing the conduct of the towing evolution and the response to the accident. Discussions with these witnesses occurred in Halifax and Sydney, NS. A particular focus for these conversations were the decisions, judgments, communications and risk assessments related to the operations on the night of 28/29 March. This covered not only several issues of *what, where and when*, but *why* as well.

It should be stated that all witnesses were cooperative, forthcoming and engaged in assisting the investigation team in building the timeline and coming to an accurate assessment of the various stages of the incident. All were motivated in helping develop a meaningful set of conclusions and lessons learned.

C.1 TOWING TRIALS

With the compilation of the recollections and perceptions provided by the witnesses complete, further explorations of the factors and dynamics of the towing process were performed by means of towing trials. They comprised of:

- A review of the towing equipment and a night-time demonstration of placement and visibility utilizing a fast rescue craft (FRC);
- A basic towing trial utilizing a 47' Rescue Cutter, aimed at assessing the motion and responses to a variety of speeds, course changes, rudder and engine input;
- A more detailed towing trial utilizing a 42' craft of hull form similar to L'ACADIEN II, where a range of movements were applied by both the towing and the towed vessels;
- Towing trials with an unmanned barge in Arctic ice to provide general analytical insights on the influence of ice in combination with a range of manoeuvres and speeds upon a towed vehicle; and
- A towing trial with significant fidelity and repeatability was enabled through the utilization of the sister-ship of L'ACADIEN II, a fishing vessel of a nearly identical configuration in hull form, rudder and displacement.

- A final set of trials utilizing a 42' craft of similar form and a smaller vessel of only 10 tons displacement was conducted to confirm repeatability, to re-check and record the possible impact of anomalies, such as uneven length of the bridle legs, and for a comparative demonstration of the movement of a lighter vessel under similar towing circumstances.

The aim of the extensive sequence of towing trials was to clearly demonstrate the potential influences of the two vessels in question as accurately as possible so as to be able to replicate certain dynamics reported by the witnesses. To the degree possible, a better understanding of the impacts of ice was sought but it was felt that the variability of ice in general and the lack of data regarding the specific ice cake which was struck in the accident, made the replication a significant challenge.

A period of material review and analysis was then conducted at the Investigation's offices in Ottawa, where comparative assessments and critical analysis of the amassed data was effected. Gaps were identified and several follow-up conversations with witnesses were undertaken to cast light on missing elements or to seek clarification of material elements or of sequencing. From this, a final best-assessment sequence of events was arrived at and assessment of the conduct of the operation was completed, along with development of lessons and recommendations.

Throughout the process, linkages with management, the survivors and families, as well as the crew of the CCGS SIR WILLIAM ALEXANDER were maintained to keep all periodically apprised of the progress and material results of the investigation.

C.2 THE PREPONDERANCE OF FACTS AND TESTIMONY

When discussing methodology and analysis, the investigation team went to great lengths to amass and absorb the entirety of the events surrounding the

capsizing of the L'ACADIEN II, from every perspective available. This included eye-witness testimony from a range of participants, with recollections from events while under severe stress, in some cases at great personal risk.

Where differences arose between witness' testimonies or between their testimonies and actual voice, data or mechanical records, the team would base their assessments on the preponderance of data available. The concept leans towards the prevalent or predominant view of events, while remaining aware of disparate observations and seeking to determine their cause. The weight of each segment of testimony was arrived at by the investigation team's capacity to compare and corroborate the information delivered. In turn an assessment of pertinence, accuracy, validity and value would emerge.

C.3 IN EXTREMIS

The Latin phrase *in extremis* is translated as *in the furthest reaches or at the point of death*. It speaks to extreme conditions or unique circumstances with significant potential risk to life. It is a common term in the maritime environment, describing thresholds in the anti-collision rules, the high-risk elements of seamanship evolutions and, often, the knife-edge of survivability often delivered by environmental conditions of wind, sea, ice and wave. An *in extremis* situation is commonly understood as the point where one no longer has full control or influence over one's fate, is essentially in the hands of God or the elements, and is clearly to be avoided if at all possible.

C.4 NAVAL ARCHITECTURE AND STABILITY

The art and science of naval architecture is both unique and rarely comprehended, especially at an expert level. The scenario of the L'ACADIEN II touches on issues of scale, stability, physics, equipment and operational conduct. Stability curves, righting moments⁸⁹, pivot points⁹⁰, and centres of gravity⁹¹

⁸⁸ See above.

⁹⁰ A ship's pivot point is a point on the centerline about which the ship turns when the rudder is put over. The pivot point scribes the ship's turning circle. Turning Circle A ship's pivot point is nearly always located about one-third the ship's length from her bow when moving ahead, and at or near her stern when moving astern. The location of the pivot point will vary with ship's speed. An increase in speed will shift the pivot point in the direction of the ship's movement.

⁹¹ The location of a ship's vertical center of gravity (KG) is an important measurement needed to estimate the initial stability of a vessel.

are not profoundly complex concepts as much as unfamiliar and not commonly understood. They offer a measurable contribution to the outcomes of the L'ACADIEN II incident, and to the understanding of the event. A civilian naval architect was engaged to assist in better appreciating the factors at play during L'ACADIEN II's collision with the ice and her subsequent capsize. The Specific elements of the calculations are included in the analysis section.

ANNEX D – SUMMARY OF RECOMMENDATIONS

NUMBER	SUBJECT	RECOMMENDATION
	Conduct of the Tow and Coast Guard Towing Policy	
1	Conduct of Towing	<p>Coast Guard should conduct a full review of towing requirements, policies, processes, training and equipment. The following areas should be addressed:</p> <ul style="list-style-type: none"> a. Development, delivery and monitoring of a singular towing policy, across the Coast Guard, with linkages to the range of applicable reference material and pertinent documentation. These material should include such key guiding publications as the SAR Secretariat's manual, which describes expectations for response in SAR, humanitarian assistance (HA) and non-SAR/HA situations; b. Development of clear seamanship procedures, standards and techniques required for a towing scenario, while leaving room for the deviations forced upon operators by the conditions at the scene, as judged by the on-scene commander. For example, for the towing of small vessels by large Coast Guard platforms, such as was required in the case of L'ACADIEN II, the default guidance should be to require the towed vessel to reduce the number of crew onboard to the absolute minimum which still allows the towing evolution to be conducted safely. This would serve to take into account the significant risks at play with such hull/power disparities. Such defaults can never become black and white absolutes, but serve as a means of highlighting concerns, of enabling the conversation between mariners, and to facilitate cooperation so as to mitigate risk. While the guidance and the defaults must be clear, the conditions at hand must always be allowed to shape judgment and actions; c. A review, in consultation with stakeholders, of the training, technology, equipment and fittings available and pertinent for future operations should be conducted. Implicit in this effort should be an assessment of the effectiveness of recent or emergent technologies such as the tensionometer, slack-hook arrangements and quick-release mechanisms. In turn, contribution to the development of modern, consistent and broadly held manuals and check-lists is in order;

NUMBER	SUBJECT	RECOMMENDATION
		<p>d. As a continuation of the work performed by the naval architect, a research and development effort through naval architectural calculations, water-tank tests and live trials to establish and better understand the where and the why of safe operating limits in a towing environment, with and without an ice dynamic, is in order. This body of knowledge should better describe the margins of safe operating procedures than as compared to the literature and professional knowledge base today. Of particular interest will be the consequences of disparate vessel sizes in towing operations. This should offer operators a better appreciation of where the risks begin to escalate, along with the potential means for mitigating specific dangers; and,</p> <p>e. Until the above efforts are ready for implementation, the establishment of an interim policy for towing and support of the sealing fleet should be formed and announced prior to the 2009 hunt.</p>
Organizational Issues		
2	Situational Awareness	Coast Guard should aggressively seek, implement and apply technological methods which deliver a "common operating picture"
3	Organization and Jurisdiction	Coast Guard should conduct a reassessment of its east coast waters' jurisdictional apportionment
4	Planning & Risk Management	Coast Guard should refine its organizational planning and risk management process for the oversight of east coast activities
5	Learning Organization	Coast Guard should promote the concept of record-keeping and analysis, as well as the value of shared professional lessons learned
Considerations Beyond the Terms of Reference and Beyond Coast Guard Authority		
6	Public and Customer Relations	Coast Guard should renew and reinvigorate engagement of the client base
7	Extra-Departmental Boundaries & Jurisdictions	Coast Guard should propose and participate in a coherent alignment of cross-Departmental jurisdictional domains within Canada's east coast waters

NUMBER	SUBJECT	RECOMMENDATION
8	Regulatory Regimes	Coast Guard should propose a review of the regulatory process, standards and inspection regime for vessels working and operating in ice with the applicable authoritative partners in the appropriate Departments

ANNEX E – CHRONOLOGICAL TIMELINE

START TIME	EVENT, POSITION & NOTES
26 March 2008 18:00	L'ACADIEN II leaves the Magdalen Islands.
27 March 2008 22:00	DES GROSEILLIERS assists sealing vessels.
28 March 2008 06:54	DES GROSEILLIERS is tasked to assist the NADINE D
10:00	SYDNEY-DES GROSEILLIERS to request that they call MRSC for a SAR tasking (NADINE D)
10:08	DES GROSEILLIERS-MRSC to discuss tasking of NADINE D - Impossible to tow in the current ice conditions
11:00	L'ACADIEN II damages its rudder.
13:00	Survivor 1 tests the steering gear. The ice field is not under pressure.
14:01	L'ACADIEN II tries to call CCG radio station Rivière-au-Renard (RIVIÈRE-AU-RENARD).
14:01	L'ACADIEN II tries to call CCG radio station Sydney (SYDNEY).
14:02	DES GROSEILLIERS-L'ACADIEN II to offer engineering support.
14:30	DES GROSEILLIERS sends two engineers onboard L'ACADIEN II.
14:45	CCG Engineers test the steering gear of L'ACADIEN II and conclude that any damage would be under water and therefore they cannot be of any assistance under the circumstances.
15:00	L'ACADIEN II tries to call DES GROSEILLIERS two times.
15:20	L'ACADIEN II-SYDNEY to communicate their problem and to request an escort to the Magdalen Islands.
15:30	SYDNEY-JRCC to communicate the L'ACADIEN II's request; JRCC suggests to speak with Ice Office in Halifax (Ice HFX).
15:37	SYDNEY-Ice HFX to discuss L'ACADIEN II; Ice HFX to call Ice office Québec (Ice QC).
15:43	SYDNEY-L'ACADIEN II to inform that the request for assistance has been communicated to Ice HFX.
15:47	Ice QC-Ice HFX to discuss the current situation with assistance requests (confusion between the NADINE D and L'ACADIEN II: Ice QC is talking about the NADINE D while Ice HFX assume they are talking about L'ACADIEN II).
16:00	GINNY CR tries to call DES GROSEILLIERS, RIVIÈRE-AU-RENARD and SYDNEY.
16:01	GINNY CR-SYDNEY to request icebreaking assistance: the vessel is taking on water (position "47 10.60 N and 60 14.8 W"). Environmental conditions are reported as flat calm (no seas).

START TIME	EVENT, POSITION & NOTES
16:04	SYDNEY-JRCC to communicate GINNY CR's request for assistance; JRCC informs that it is a request for Ice HFX and not a SAR request.
16:06	Ice HFX-SYDNEY to discuss the L'ACADIEN II situation and incorrectly reports that QC region is looking after the L'ACADIEN II (as a result the confusion during their conversation with Ice QC).
16:07	SYDNEY-Ice HFX to discuss GINNY CR situation; at this point, it is not a SAR case and no ice escort will be provided. Ice HFX mentions that the SIR WILLIAM ALEXANDER is in Sydney for traffic (Ferry) and security; will be tasked only if it is a SAR case.
16:11	SYDNEY-GINNY CR to inform that at this time, unless it is a SAR case, CCG cannot provide the requested escort since the icebreakers are tasked elsewhere. GINNY CR is advised that he should call the CCG if his situation changes.
16:17	SYDNEY-JRCC to discuss the situation of the GINNY CR and the fact that there will be no ice escorts other than to respond to a SAR tasking.
16:20	GINNY CR-SYDNEY to communicate that they are taking on more water when trying to manoeuvre.
16:21	JRCC-Ice HFX to seek clarification on Ice escort policy and available resources for SAR (more specifically DES GROSEILLIERS and SIR WILLIAM ALEXANDER).
16:22	SYDNEY-JRCC to inform that the GINNY CR situation has deteriorated (taking on more water).
16:30	JRCC-GINNY CR to seek an update on status, to gather required information and to discuss policy on towing to the nearest port as opposed to the home port.
16:41	L'ACADIEN II-SYDNEY to request an update since he is drifting toward shoreline. SYDNEY tells L'ACADIEN II that he should expect a call from DES GROSEILLIERS.
16:45	SYDNEY-Ice HFX to discuss L'ACADIEN II; they assume that Ice QC has been handling the case. Also update on GINNY CR being handed off to JRCC as a SAR case.
16:53	MADLINOT WAR LORD-SYDNEY to request assistance of an icebreaker to get out of the ice; he is taking on water. Position "46 52.51 N and 60 04.55 W".
16:57	JRCC-MRSC to request DES GROSEILLIERS' fax number for GINNY CR tasking.
17:07	SYDNEY-JRCC & Ice HFX to discuss MADLINOT WAR LORD situation; not a SAR case yet.
17:09	JRCC-Maritimes Regional Operation Center (ROC) to discuss the likelihood of the SIR WILLIAM ALEXANDER to be tasked to SAR cases given the current situation. There is a mention that GEORGE R PEARKES may be transiting towards Cape Breton.
17:12	SYDNEY-JRCC to seek an update on GINNY CR; JRCC informs that they are trying to contact DES GROSEILLIERS.
17:18	JRCC-SYDNEY to request them to relay tasking of GINNY CR to the DES GROSEILLIERS.
17:20	SYDNEY-DES GROSEILLIERS to issue GINNY CR SAR tasking; Position of GINNY CR "47 10.60 N and 60 14.8 W".
17:26	JRCC-GINNY CR to inform him that the DES GROSEILLIERS has been tasked to assist.

START TIME	EVENT, POSITION & NOTES
17:28	L'ACADIEN II-SYDNEY to seek an update; discussion on SAR and Ice tasking priorities. Position "46 53.24 N and 60 06.52 W".
17:34	JRCC-DES GROSEILLIERS to confirm GINNY CR tasking.
17:36	JRCC-SYDNEY to request position of DES GROSEILLIERS and SYDNEY provides an update on L'ACADIEN II. SYDNEY mentions that L'ACADIEN II is becoming impatient.
17:46	SYDNEY-DES GROSEILLIERS to request position and passes it on to JRCC ("46 54 N and 59 58 W").
17:56	MADELINOT WAR LORD-SYDNEY to ask if his request for assistance has been passed on. MADELINOT WAR LORD also asks why the DES GROSEILLIERS did not take him under escort.
18:10	DES GROSEILLIERS tries to call MADELINOT WAR LORD.
18:11	SYDNEY-L'ACADIEN II to request position update ("46 52.65 N and 60 07.82 W").
18:13	JRCC-SYDNEY to request MADELINOT WAR LORD cellular phone number; Discussion on possible tasking of SIR WILLIAM ALEXANDER.
18:18	JRCC-MADELINOT WAR LORD to advise him that SIR WILLIAM ALEXANDER will be tasked to assist him. MADELINOT WAR LORD mentions the situation of L'ACADIEN II.
18:24	JRCC-Ice HFX to provide an update on situation with MADELINOT WAR LORD and to voice general concerns for the Sydney Bight area. Ice HFX is not aware of DES GROSEILLIERS being in the area.
18:29	JRCC-SYDNEY to discuss SIR WILLIAM ALEXANDER tasking to MADELINOT WAR LORD and situation of L'ACADIEN II. They still assume that QC region has been dealing with L'ACADIEN II.
18:33	JRCC-MRSC to seek clarification on whether QC region has been involved with L'ACADIEN II; Negative.
18:39	JRCC-DES GROSEILLIERS to ask information on their involvement with L'ACADIEN II and why they did not notify anyone. DES GROSEILLIERS said he had received no tasking for L'ACADIEN II.
18:48	JRCC-SIR WILLIAM ALEXANDER to discuss tasking of MADELINOT WAR LORD and L'ACADIEN II (potential towing operation).
18:57	JRCC-SYDNEY to request L'ACADIEN II's position.
18:57	GINNY CR-DES GROSEILLIERS going to channel 10.
18:59	JRCC tasks SIR WILLIAM ALEXANDER SAR case 319 (L'ACADIEN II) and 318 (MADELINOT WAR LORD). Weather conditions generally good (winds NE 20 knots, flat seas (inside broken ice edge) and light snow. Conditions forecasted to deteriorate.
19:17	Weather forecast broadcast - Weather forecast for Cabot Strait-winds increasing to NE 15-20 knots overnight, winds increasing to NW 25-30 Saturday afternoon, occasional snow, visibility fair to poor in precipitation, freezing spray over open water Saturday afternoon, temps -2 to 0 lowering to near -5 Saturday morning, outlook for Sunday, strong to gale force NW.

START TIME	EVENT, POSITION & NOTES
19:26	SIR WILLIAM ALEXANDER departs Sydney.
19:35	SIR WILLIAM ALEXANDER makes a Security call coming out of SYDNEY Harbour.
19:38	DES GROSEILLIERS tries to call L'ACADIEN II.
19:40	SYDNEY-JRCC to inform them that they have received a call from WENDYCORA (Position "46 55.329 N and 59 57.542 W") wondering if the SIR WILLIAM ALEXANDER could assist them while in the area (not an emergency). Discussion on L'ACADIEN II and whether he still needs CCG assistance. JRCC requests information on number of fishing vessels in the area.
19:45	SYDNEY tries to call MADELINOT WAR LORD twice.
19:46	SYDNEY-L'ACADIEN II to find out if they still require CCG assistance; Affirmative. SYDNEY makes him aware that SIR WILLIAM ALEXANDER is being tasked and asks for the cellular phone number.
19:47	JRCC-Ice HFX to pass on the WENDY CORA's request for escort.
19:49	SYDNEY-JRCC to confirm that L'ACADIEN II still needs assistance and to provide the cellular phone number.
19:53	JRCC-L'ACADIEN II to confirm that the SIR WILLIAM ALEXANDER has been tasked.
20:06	L'ACADIEN II-SYDNEY to confirm that he received call from JRCC and to request assistance to find a travel lift in Sydney to take the vessel out of the water.
20:08	JRCC-SYDNEY to communicate the SIR WILLIAM ALEXANDER plan to go to MADELINOT WAR LORD first and L'ACADIEN II after. Estimated Time of Arrival (ETA) 22:30.
20:09	SIR WILLIAM ALEXANDER-JRCC to confirm that they are en route and to request an update on status of vessels.
20:15	JRCC-ROC to express concerns about the situation and the potential for it to get worse. Discussion of the CCG resources available around the Gulf of St-Lawrence.
20:17	SYDNEY-JRCC to request a list of local ship repair facilities in Sydney for L'ACADIEN II.
20:24	SYDNEY tries to call L'ACADIEN II on channel 24 three times.
20:28	L'ACADIEN II tries to call MADELINOT WAR LORD on channel 16.
20:34	SYDNEY tries calling L'ACADIEN II on channel 16.
20:35	JRCC-CCG Auxiliary member in Sydney to request information on potential ship repair facilities.
20:38	L'ACADIEN II-MADELINOT WAR LORD going to channel 17.
20:39	DES GROSEILLIERS-JRCC to advise that they are en route to the GINNY CR and will call back once the escort starts.
20:39	JRCC-Sydney ship repair facility; Left a voicemail.
20:41	JRCC-ROC to discuss problem transmitting the tasking by fax to the SIR WILLIAM ALEXANDER.

START TIME	EVENT, POSITION & NOTES
20:43	MADELINOT WAR LORD-SIR WILLIAM ALEXANDER going to channel 18.
20:46	JRCC- SYDNEY to communicate contact information of the ship repair facility.
20:53	GINNY CR-DES GROSEILLIERS to discuss the escort operation.
20:59	SYDNEY-L'ACADIEN II to communicate the information on shipyard, to request specifications of L'ACADIEN II and to request current local weather conditions (Winds NE at 10 Km/h).
21:08	DES GROSEILLIERS-JRCC to advise that they have the GINNY CR under escort.
21:10	SYDNEY tries to call L'ACADIEN II on 16.
21:20	Ice QC-Ice HFX to discuss vessel tasking in the Atlantic Zone.
21:21	JRCC-SYDNEY to advise that GINNY CR is under escort and DES GROSEILLIERS will call once in open water.
21:26	SYDNEY-L'ACADIEN II to request position update ("46 51.874 N and 60 09.916 W").
21:31	SYDNEY-SIR WILLIAM ALEXANDER to pass on the information on L'ACADIEN II.
21:53	SIR WILLIAM ALEXANDER-L'ACADIEN II to request update on position ("46 51.87 N and 60 09.99 W").
21:59	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to request update on position and damage ("46 50.235 N and 60 07.668 W").
22:01	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to request more information on capacity to get under way; discussion on the WENDY CORA.
22:06	SIR WILLIAM ALEXANDER tries to call L'ACADIEN II two times.
22:10	SIR WILLIAM ALEXANDER-JRCC to communicate that they are approaching the disabled vessels. Discussion of the plan to have a very short tow line and agreement to escort WENDY CORA towards Sydney after discussing with the ROC.
22:11	L'ACADIEN II-SIR WILLIAM ALEXANDER to ask if he will be able to tow.
22:16	SIR WILLIAM ALEXANDER-WENDY CORA to request position ("46 54.259 N and 59 56.617 W").
22:22	SIR WILLIAM ALEXANDER-L'ACADIEN II to communicate that they are three miles away and to request information for hooking up the tow.
22:23	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to communicate the intention of taking the L'ACADIEN II under tow before taking the MADELINOT WAR LORD in escort.
22:29	SIR WILLIAM ALEXANDER tries to call L'ACADIEN II three times.
22:31	SYDNEY-L'ACADIEN II to ask them to stand by on channel 16 for the SIR WILLIAM ALEXANDER.
22:32	SIR WILLIAM ALEXANDER-L'ACADIEN II to discuss towing arrangements and to read the towing assistance instructions.
22:42	SIR WILLIAM ALEXANDER alongside L'ACADIEN II.

START TIME	EVENT, POSITION & NOTES
22:51	Tow connected ("46 52.0 N and 60 10.2 W") - proceeding to the MADELINOT WAR LORD's position. The towing arrangement consisted of a 1 1/2 inch double braided nylon tow line with a 1 1/8 inch 50 ft bridle for a total length of less than 90 feet.
22:58	<p>L'ACADIEN II-SIR WILLIAM ALEXANDER to communicate that "it is going well" - agreement on one person in the wheelhouse of L'ACADIEN II at all time and on radio frequencies to be monitored.</p> <p>Onboard SIR WILLIAM ALEXANDER, two seamen were posted aft by the amidships towing fairlead to observe the towed vessel. The seaman had an axe and a radio to communicate with the SIR WILLIAM ALEXANDER wheelhouse. The Chief Officer left instructions for them to stand two-hour watches and authorized the towing watch to cut the tow line, without seeking bridge permission before hand, if needed. The Chief Officer remained aft for about 30 minutes to observe the behaviour of the towed vessel. He noted that the tow was sheering from side to side and the L'ACADIEN II had a long roll period. SIR WILLIAM ALEXANDER searchlights were pointed forward to assist the Commanding Officer in his ice navigation. The three fixed floodlights on the after winch deck of the SIR WILLIAM ALEXANDER were on to enable the two seamen to monitor the tow.</p>
23:34	<p>SIR WILLIAM ALEXANDER-WENDY CORA to request position update ("46 53.285 N and 59 56.139 W").</p> <p>The SIR WILLIAM ALEXANDER bridge watch comprised the Commanding Officer, Officer of the Watch and Quartermaster. They monitored VHF channel 6 (agreed channel to communicate with L'ACADIEN II), channel 16 and channel 19 for the two seamen aft standing by the tow line."</p>
23:40	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD going to channel 10.
29 March 2008	
00:04	SIR WILLIAM ALEXANDER passes alongside MADELINOT WAR LORD to free her from the ice (position "46 50.0 N and 60 07.9 W").
00:08	<p>SIR WILLIAM ALEXANDER heading to the WENDY CORA with MADELINOT WAR LORD under escort behind L'ACADIEN II.</p> <p>The two SIR WILLIAM ALEXANDER deckhands on towing watch observed the L'ACADIEN II sheer from side to side and were concerned at times and came close to cutting the tow line.</p>
00:14	SIR WILLIAM ALEXANDER-JRCC to request SAR tasking numbers.
00:27	SIR WILLIAM ALEXANDER-JRCC to communicate Situation Report.
00:53	SIR WILLIAM ALEXANDER-SYDNEY to request latest weather forecast (Winds NE 10-15 increasing to 15-20 overnight changing to NW 25-30 Saturday PM changing to strong to gale NW on Sunday).
00:55	<p>SIR WILLIAM ALEXANDER aft towing watch change as per instructions.</p> <p>In the turn over, the behaviour of the towed vessel was discussed as well as some of the close calls in regard to almost cutting the tow line, the dazzle of the MADELINOT WAR LORD lights, the radio in use and the pre-authorization to use the axe to cut the tow line. At about 0100 the relieving watch called the bridge on their radio to inform them that the other watch was relieved and all was in order.</p>

START TIME	EVENT, POSITION & NOTES
01:00	SIR WILLIAM ALEXANDER Commanding Officer constantly adjusts the speed as necessitated by ice, tow conditions and course considerations. The shaft RPM varying from 50 to 70.
01:00	Deck head lights on the afterdeck switched off for better night vision (not the flood lights).
01:01	The two vessels enter an open water area.
01:01	Speed increases slightly to 4.1 knots and consistently decreases thereafter to approximately 2.8 knots.
01:02	DES GROSEILLIERS-GINNY CR to discuss the escort.
01:05	The SIR WILLIAM ALEXANDER Commanding Officer on the starboard bridge console looking aft sees L'ACADIEN II taking a quicker than usual sheer to port.
01:05	L'ACADIEN II reports that they slowly went to the port side of the SIR WILLIAM ALEXANDER (just off the quarters of SIR WILLIAM ALEXANDER) and after a short moment saw a large piece of ice.
01:05	The SIR WILLIAM ALEXANDER after towing watch reports that they saw L'ACADIEN II suddenly and quickly sheer to port to about 60 degrees from the center line
01:06	The SIR WILLIAM ALEXANDER Commanding Officer proceeds quickly to the port side console. As L'ACADIEN II approaches a large ice cake, the Commanding Officer puts the engine controls to full astern. The towing watch is instructed to cut the tow line.
01:06	The SIR WILLIAM ALEXANDER after towing watch, after noticing the presence of an ice cake coming down the port side of the SIR WILLIAM ALEXANDER, quickly proceed back to the center line of the SIR WILLIAM ALEXANDER.
01:07	L'ACADIEN II pushes the engine control to full ahead as the vessel hits the ice cake.
01:07	L'ACADIEN II makes contact with the ice cake.
01:07	Seaman 1 calls the bridge of SIR WILLIAM ALEXANDER to inform them of increasing tension on the line.
01:07	After seeing L'ACADIEN II on her side, Seaman 1 cuts the tow line with one swing of the axe.
01:07	L'ACADIEN II capsizes completely (Position "46 49.28 N and 60 03.99 W").
01:07	SIR WILLIAM ALEXANDER stern starts sheering/drifts to port as the vessel stops in the water.
01:07	Numerous radio calls are made and heard but not all answered. The Commanding Officer was focussed on turning the SIR WILLIAM ALEXANDER in the ice to return and render all possible assistance to the L'ACADIEN II and organizing a rescue plan and consequently was not able to respond to each and every radio call.
01:08	Survivor 1 is seen trying to climb on the overturned L'ACADIEN II and is immediately rescued by the MADELINOT WAR LORD.
01:08	SIR WILLIAM ALEXANDER Commanding Officer and Officer of the watch go to the starboard wing and see that L'ACADIEN II is capsized.

START TIME	EVENT, POSITION & NOTES
01:09	Survivor 2 is seen climbing on a piece of ice on the left side of the capsized vessel and was also rescued by the MADELINOT WAR LORD.
01:09	Seaman 2 calls the bridge of SIR WILLIAM ALEXANDER to report the line was cut, that the L'ACADIEN II was rolled over and that two persons were seen in the water and their subsequent recovery.
01:09	The SIR WILLIAM ALEXANDER after towing watch reports seeing the propeller turning rapidly and the rudder at midships.
01:10	The SIR WILLIAM ALEXANDER Commanding Officer calls the Chief Officer to the bridge.
01:11	The SIR WILLIAM ALEXANDER Commanding Officer orders the general alarm sounded, a pipe is made "All hands on deck, fishing vessel capsized" and requests to prepare the Fast Rescue Craft (FRC).
01:13	SIR WILLIAM ALEXANDER-JRCC to report the situation.
01:15	JRCC-SIR WILLIAM ALEXANDER to request position update for the mayday relay ("46 49.18 N and 60 03.9 W").
01:15	JRCC-SYDNEY to report the incident and to request a mayday relay broadcast.
01:16	SIR WILLIAM ALEXANDER Fast Rescue Craft (FRC) Radio Check.
01:17	JRCC decides to request the standby CORMORANT and HERCULES R307 from Greenwood with four SAR Techs (rescue divers).
01:19	SYDNEY issues the mayday relay specifically requesting divers. Some merchant ships respond, but they have no divers or diving equipment.
01:19	JRCC-Ice HFX to report the situation.
01:20	FRC launched with the chief officer and two seamen onboard.
01:23	JRCC pages CORMORANT and HERCULES from Greenwood.
01:23	JRCC briefs and tasks CORMORANT Helicopter from Greenwood.
01:25	JRCC-SIR WILLIAM ALEXANDER to report that the HERCULES R307 (Rescue divers onboard) will take about three hours to get to the scene and, that at this time, they have been unsuccessful to contact divers in Sydney. SIR WILLIAM ALEXANDER will attempt to secure the L'ACADIEN II alongside and discussion on the possibility of cutting into the hull as survival time is limited.
01:26	FRC alongside L'ACADIEN II; crew reports hearing some tapping from inside the capsized vessel.
01:28	WENDY CORA tries to contact SIR WILLIAM ALEXANDER on channel 16.
01:29	SYDNEY-JRCC to provide an update and a list of the fishing vessels and merchant ships that have responded to the mayday relay but none have divers onboard or they are too distant or too large to assist. They are stood down. The search for divers now shifts to local area companies who would be available or capable of assistance.
01:29	SIR WILLIAM ALEXANDER deck crew preparing straps to secure L'ACADIEN II.

START TIME	EVENT, POSITION & NOTES
01:30	Man Overboard emergency checklist completed.
01:33	Someone tries to contact SIR WILLIAM ALEXANDER on 16.
01:33	SYDNEY-JRCC to provide update on response to mayday relay. JRCC instructs SYDNEY to stand them down.
01:34	MADELINOT WAR LORD-SIR WILLIAM ALEXANDER to advise “better do something fast here if you want to keep this boat up”. Acknowledged by the SIR WILLIAM ALEXANDER.
01:35	Fishing vessel-MADELINOT WAR LORD asking to go on channel 10.
01:36	SYDNEY-JRCC to pass some information on diving companies and JRCC advised that a HERCULES R307 with divers has been tasked.
01:37	JRCC tasks and briefs the HERCULES R307 aircraft commander on the situation ETA is now 2.5 hours.
01:40	JRCC reaches a diving company who advises that the Cape Breton Regional Police and some fire departments have dive teams.
01:40	FRC alongside SIR WILLIAM ALEXANDER to take the strops.
01:41	Unidentified station (WENDY CORA?)-SIR WILLIAM ALEXANDER to ask whether they had any diving equipment onboard as they (the unidentified station) have a diver. No response recorded.
01:42	FRC underway to L'ACADIEN II.
01:44	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD asking to go on channel 06.
01:44	JRCC-Cape Breton Regional Police dispatch to request divers. They advise that they will muster the team and discuss timeline but it will be 2.5 hours just to get to Neil's Harbour.
01:45	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to request some manoeuvring space.
01:48	SYDNEY-JRCC to pass on more dive company information and consideration being given to contacting and using local police and firefighting service if dive capable.
01:49	Regional Operation Center (ROC) briefed on details, they were aware of the situation from speaking with the Commanding Officer of the SIR WILLIAM ALEXANDER.
01:50	SYDNEY talks to a diving company who recommended another one (the only one that might be able to do the work but the person is in Halifax).
01:50	MADELINOT WAR LORD-SIR WILLIAM ALEXANDER to report that there were 4 persons sleeping in the accommodation of L'ACADIEN II.
01:50	SIR WILLIAM ALEXANDER manoeuvres towards L'ACADIEN II.
01:52	SYDNEY-JRCC to relay information on diving company. No one is available.
01:57	FRC crew finishes putting the straps around the rudder and propeller shaft of L'ACADIEN II.
01:59	SYDNEY-JRCC to discuss information on L'ACADIEN II and diving contacts.
01:59	JRCC-CCG Auxiliary member requesting information on diving capacity around Cape Breton.

START TIME	EVENT, POSITION & NOTES
02:01	SYDNEY-JRCC on diving contacts.
02:01	Cape Breton Regional Police-JRCC to advise that they don't have the proper equipment and will not be able to assist.
02:02	SIR WILLIAM ALEXANDER manoeuvres to pick up FRC.
02:03	SANDRANDORE-SYDNEY to inform that a group of 5 fishing vessels would like to proceed to the scene despite making only about 2 knots through the ice.
02:03	JRCC-SIR WILLIAM ALEXANDER to provide update on latest effort to contact diving companies. JRCC briefs the Commanding Officer on HERCULES R307 ETA (0400) and the fact that they still don't know if they will dive. It is recommended that they attempt to cut into the hull of L'ACADIEN II now. The trapped people are likely partially immersed in light clothing and may not survive for 3 hours and the capsized vessel may sink in the next few hours. The vessel is currently floating flat on the water so there is a good possibility that there are air pockets in the engine room and hold.
02:03	FRC onboard SIR WILLIAM ALEXANDER.
02:04	SIR WILLIAM ALEXANDER manoeuvres to go along side L'ACADIEN II.
02:04	Diving Company-JRCC to confirm that they don't have the resources locally and will not be able to assist.
02:06	JRCC-North Sydney Fire Department to request assistance; no dive team but Sydney Mines fire department has one.
02:07	SYDNEY-JRCC, regarding a group of fishing vessels proceeding to the scene. The consensus is that they may put the group at risk given the weather and ice conditions.
02:09	SYDNEY-SANDRANDORE to advise that they should not put the fishing vessels at risk.
02:10	SYDNEY-Environment Canada to listen to the weather conditions at St-Paul's Island. Information passed on to SANDRANDORE.
02:18	HERCULES R307 aircraft commander discussing whether they should dive once on scene or wait for the CORMORANT and dive as a 4 person dive team.
02:24	SANDRANDORE-SYDNEY to ask if divers are on their way.
02:24	SIR WILLIAM ALEXANDER's deck crane hooked on to the straps to support L'ACADIEN II.
02:26	SIR WILLIAM ALEXANDER-JRCC to discuss preparation to cut into the hull.
02:29	ROC-JRCC to discuss media relations and to provide update on the situation.
02:30	SYDNEY-JRCC and SANDRANDORE to confirm that divers are coming.
02:35	JRCC-MADELINOT WAR LORD to request information on the crew of the L'ACADIEN II and discuss the possibility of cutting into the hull.
02:36	JRCC-Sydney Mines fire department to brief them. A 5 person dive team will be dispatched to Neil's Harbour to assist as required. ETA 0430.
02:36	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to request assistance in passing another strap under the bow of L'ACADIEN II.

START TIME	EVENT, POSITION & NOTES
02:39	SIR WILLIAM ALEXANDER-JRCC to discuss reservations about cutting into the hull. Agreement to delay the cutting until vessel is better stabilized with the help of MADELINOT WAR LORD. MADELINOT WAR LORD alongside the SIR WILLIAM ALEXANDER.
02:45	SANDRANDORE tries to contact the SIR WILLIAM ALEXANDER and exchanges information with one of the survivors onboard the MADELINOT WAR LORD.
02:47	Bow strop hooked on.
02:48	JRCC-MRSC to request their support in contacting the Sûreté du Québec (SQ) to notify the families.
02:57	JRCC advised that the CORMORANT is delayed 15 minutes due to communication equipment problems.
02:59	Ice HFX-JRCC to confirm that the DES GROSEILLIERS was assisting the L'ACADIEN II earlier in the day.
02:59	L'ACADIEN II deemed stabilized - crew getting ready to go on overturned vessel to cut into the hull.
03:00	HERCULES R307 departs Greenwood.
03:01	SIR WILLIAM ALEXANDER seaman on the hull of L'ACADIEN II.
03:02	JRCC advised that stand by CORMORANT is unserviceable and that they will require an extra 30 minutes to switch to another one.
03:03	Seaman starts cutting into the hull. MADELINOT WAR LORD alongside L'ACADIEN II.
03:07	SIR WILLIAM ALEXANDER-JRCC to advise that L'ACADIEN II is properly secured and that they are starting to cut into the hull. SIR WILLIAM ALEXANDER is briefed on the status of the Sydney Mines dive team bound for Neil's Harbour and discussed the possibility of a fishing vessel picking them up but it is deemed impossible due to ice conditions. JRCC also advises that the HERCULES R307 with two divers will be on scene in fifty minutes.
03:13	MRSC-JRCC to confirm that SQ has been briefed and will contact the families. JRCC requests that someone from the Magdalen Islands be appointed to represent the families to liaise with JRCC.
03:14	SYDNEY-SANDRANDORE to pass on the latest weather forecast (Gale warning issued freezing spray warning continued winds northeast one five knots increasing to northwest two zero to two five this afternoon winds diminishing to westerly one zero to one five this evening winds increasing to northeast two five to three zero Sunday morning and back to northerly winds three zero to gales three five Sunday afternoon snow tapering to occasional flurries this morning occasional flurries on Sunday visibility fair to poor in precipitation freezing spray over open water beginning this afternoon ending this evening temperatures minus eleven to minus three the outlook for Monday strong north westerly diminishing to moderate north westerly).
03:15	SANDRANDORE requests an escort for 7 fishing vessels to the Magdalen Islands (position "46 49 10 N and 59 94 89 W").

START TIME	EVENT, POSITION & NOTES
03:20	JRCC-SIR WILLIAM ALEXANDER to discuss diver gear recovery if launched from the HERCULES R307. Discussion on the slow progress of the hull cutting operation because of the tight spacing of the frames. Confirmation that the hull is still secured and stable.
03:21	Cutting operation suspended - frames too deep and close together.
03:24	SYDNEY-JRCC to pass on the SANDRANDORE request for assistance.
03:27	SIR WILLIAM ALEXANDER seaman back onboard.
03:27	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to request assistance with picking up divers and equipment once they jump from the HERCULES R307.
03:28	SIR WILLIAM ALEXANDER-JRCC to inform that they cannot get through the hull. Discussion on option to tow the vessel or to try to right it up.
03:30	HERCULES R307 ETA is now 0355 delayed because of turbulence.
03:30	HERCULES R307 tries to call SIR WILLIAM ALEXANDER.
03:32	SYDNEY-Ice HFX to pass on the SANDRANDORE's request for escort to the Magdalen Islands.
03:35	CORMORANT R903 departs Greenwood.
03:37	HERCULES R307-SIR WILLIAM ALEXANDER going to channel 19 to discuss the recovery of the diving equipment and SAR Techs after the jump from the airplane.
03:39	SQ-MRSC to request details on the incident.
03:40	HERCULES R307-SIR WILLIAM ALEXANDER to discuss progress on cutting into the hull (slow because of the framing).
03:43	SANDRANDORE-SYDNEY to mention that he has just spoken with the survivors and is requesting that the two survivors be flown to the Magdalen Islands by a CCG helicopter or be transferred to the SANDRANDORE if not possible. He also mentions that one of the survivors would like to announce the incident directly to his family.
03:44	SIR WILLIAM ALEXANDER-JRCC to advise that they have been unsuccessful in cutting the hull and that they will have to wait for divers. Discussion on towing the capsized vessel concluded that it was not an option as it would result in the sinking of the vessel. The SIR WILLIAM ALEXANDER advises that L'ACADIEN II is now lower in the water and that the crew is working on securing it with extra lines.
03:45	SQ-JRCC to request an update on the situation and to advise that two constables are informing the next of kin and that they are in the process of finding a representative to liaise directly with JRCC.
03:46	CORMORANT R903 ETA is 0530.
03:47	SYDNEY-JRCC to advise that one of the survivors currently onboard the MADELINOT WAR LORD would like to inform the families himself. JRCC mentions that the SQ has already been tasked to notify the families. JRCC will inform SQ and pass on the MADELINOT WAR LORD phone number.
03:55	SIR WILLIAM ALEXANDER puts another line to secure the stern of L'ACADIEN II should one of the straps let go due to the increasing weight.

START TIME	EVENT, POSITION & NOTES
03:58	HERCULES R307 on scene.
03:57	JRCC-ROC to update on the situation. ROC advises that the SIR WILLIAM ALEXANDER has developed a list of 2.5 degrees as a result of L'ACADIEN II taking on water and that they may decide to release the hull if it compromise the safety of the SIR WILLIAM ALEXANDER.
04:01	JRCC-SIR WILLIAM ALEXANDER to suggest using the helicopter's rescue gear to spread the frames of L'ACADIEN II.
04:02	JRCC-Sydney fire department to arrange to have cutting gear on standby for helicopter transport to the SIR WILLIAM ALEXANDER.
04:04	SIR WILLIAM ALEXANDER-JRCC to advise that the helicopter rescue gear onboard is not suitable for spreading the frames and to inform that the MADELINOT WAR LORD are now sealing the cuts made into the hull of L'ACADIEN II.
04:05	CORMORANT R903-SYDNEY to inform that their ETA is one hour and fifteen minutes and to request an update from the HERCULES R307.
04:05	The hole in L'ACADIEN II is sealed with wooden wedge and low expansion foam.
04:07	HERCULES R307-JRCC to discuss situation on scene.
04:08	JRCC-SYDNEY to request that they ask the CORMORANT R903 to stop by Sydney to pick up cutting equipment. The request was later cancelled in order to get the divers on scene more rapidly.
04:16	SYDNEY-HERCULES R307-CORMORANT R903-JRCC - Phone patch on VHF to discuss the operation
04:17	JRCC-SYDNEY to request that they establish VHF communication with the HERCULES R307 since they are having problems with the HF equipment and to provide an update on the situation.
04:19	ROC-JRCC to provide an update. The list of SIR WILLIAM ALEXANDER is stabilized.
04:20	HERCULES R307-JRCC (through SYDNEY) to advise that the divers are getting ready to jump. They will drop the equipment first and if it is recovered, the divers will jump.
04:25	Sydney Mines fire department advises that they are 45 minutes away from Neil's Harbour and that they have extra tanks and divers.
04:26	SYDNEY gets local weather from the HERCULES R307 and transmits it to the CORMORANT R903.
04:28	SYDNEY-SIR WILLIAM ALEXANDER to request position update to transmit it to the CORMORANT R903 ("46 46.88 N and 60 02.9 W").
04:30	ROC-JRCC to discuss moving the GEORGE R PEARKES towards Cape Breton since the SIR WILLIAM ALEXANDER is not available to respond to other SAR tasking.
04:30	MADELINOT WAR LORD-SIR WILLIAM ALEXANDER to ask what is the plan for the two survivors whether they will transfer to the SIR WILLIAM ALEXANDER and how they will go home. SIR WILLIAM ALEXANDER to verify with shore management and to respond later.
04:42	JRCC-JRCC Victoria to request advice on diving operations.

START TIME	EVENT, POSITION & NOTES
04:42	HERCULES R307 drops a smoke flare.
04:48	SIR WILLIAM ALEXANDER-JRCC to advise that the HERCULES R307 has done the first equipment drop which has been recovered by the MADELINOT WAR LORD.
04:49	SANDRANDORE-SYDNEY to ask if there was any development on the earlier request (transporting the survivors and informing the families) - It has been passed to JRCC but nothing back yet.
04:56	HERCULES R307 drops diving gear.
04:57	MADELINOT WAR LORD recovers the diving gear.
04:58	CORMORANT R903 is 25 minutes away.
05:00	HERCULES R307-SIR WILLIAM ALEXANDER to advise that the divers will be ready to jump in 15 minutes.
05:01	JRCC-SIR WILLIAM ALEXANDER to confirm that they have received a picture of L'ACADIEN II for the SAR Techs to look at in preparation for their dive.
05:02	HERCULES R307-SIR WILLIAM ALEXANDER to request that a search light be moved over the jump area.
05:11	Preparation for flight deck operation onboard SIR WILLIAM ALEXANDER for the arrival of the SAR Techs from the CORMORANT R903.
05:20	CORMORANT R903 on scene.
05:28	JRCC-ROC to update them on the situation and to advise that a CCG helicopter might be required to transfer equipment to SIR WILLIAM ALEXANDER.
05:29	First SAR Tech hoisted down on SIR WILLIAM ALEXANDER flight deck from CORMORANT R903.
05:31	First basket of SAR Tech equipment hoisted down on SIR WILLIAM ALEXANDER flight deck.
05:32	JRCC-ROC to request that a CCG helicopter be placed on standby to assist as required. ROC advises that the GEORGE R PEARKES is departing NL region towards Cape Breton.
05:35	Second basket of SAR Tech equipment hoisted down on SIR WILLIAM ALEXANDER flight deck.
05:37	Second SAR Tech hoisted down on SIR WILLIAM ALEXANDER flight deck.
05:38	SQ-JRCC to advise that there is only one family left to be notified, that a crisis center has been set up and that a person has been designated to liaise with JRCC.
05:40	The CORMORANT R903 is heading for SYDNEY to refuel.
05:40	Commanding Officer briefs one of the SAR Techs on the situation.
05:43	A SAR Tech onboard SIR WILLIAM ALEXANDER advises the HERCULES R307 that the two other SAR Techs will be needed.
05:46	SIR WILLIAM ALEXANDER-JRCC to communicate the dive plan.

START TIME	EVENT, POSITION & NOTES
05:46	SIR WILLIAM ALEXANDER-MADELINOT WAR LORD to request information on equipment on deck of L'ACADIEN II to pass on to the SAR Techs.
06:00	The two SAR Techs jump off the HERCULES R307. One lands on ice and the other in the water.
06:02	ROC-JRCC to provide an update received from SIR WILLIAM ALEXANDER.
06:06	CORMORANT R903 on the ground in SYDNEY; the helicopter will remain stand by until needed.
06:06	MADELINOT WAR LORD-HERCULES R307 to inform that the two SAR Techs are onboard.
06:08	SYDNEY-JRCC to advise that HERCULES R307 SAR Techs are in the water.
06:15	MADELINOT WAR LORD alongside L'ACADIEN II lowers the seal ramp to load the SAR Techs diving equipment from the SIR WILLIAM ALEXANDER.
06:18	Sydney Mines fire department divers are in Neil's Harbour ready to assist as required.
06:27	HERCULES R307-SIR WILLIAM ALEXANDER to request status on the SAR Techs. The four of them are onboard SIR WILLIAM ALEXANDER discussing the dive plan.
06:30	SAR Techs are preparing for the dive operation from the hull of the overturned vessel.
06:31	SQ-JRCC for a briefing and to confirm that all families have been notified.
06:31	MADELINOT WAR LORD-SIR WILLIAM ALEXANDER to ask if one of the survivors could go onboard the SIR WILLIAM ALEXANDER to talk to the Commanding Officer - granted, Chief Officer will escort him to the bridge.
06:37	SIR WILLIAM ALEXANDER-ROC to request a helicopter to fly the survivors to the Magdalen Islands.
06:42	JRCC-SYDNEY Mines fire department to update them.
06:50	SAR Techs begin the diving operation. Over the next 60 minutes, the SAR Techs commence a series of four separate dives following a rotation in which each SAR Tech takes a turn as diver, tender, backup safety diver and warm up. The water temperature is near zero so a diver can only remain in the water for a short period of time.
06:52	First SAR Tech enters the water from the stern of L'ACADIEN II and, upon entering the vessel finds two victims.
06:54	SIR WILLIAM ALEXANDER-SYDNEY to inform them that there is a SAR Tech in the water.
06:54	HERCULES R307-JRCC to inform that they have one hour left on scene and discuss plans to bring back the SAR Techs.
06:55	Families contact person-JRCC to request information on when the survivors will be flown back home.
06:59	HERCULES R307-JRCC (through SYDNEY) to advise that they have one hour left on scene and will be flying back to Greenwood.
07:00	First victim recovered from the water.

START TIME	EVENT, POSITION & NOTES
07:01	SANDRANDORE-SIR WILLIAM ALEXANDER going to Channel 6.
07:05	Second victim recovered from the water. First SAR Tech out of the water.
07:11	JRCC-SIR WILLIAM ALEXANDER to request an update. SIR WILLIAM ALEXANDER confirms that the SAR Techs have started diving and that cutting equipment is no longer required. More sensitive information will be passed through secured means.
07:14	Sydney Mines fire department stood down.
07:15	Second SAR Tech in the water; he continues searching and securing floating debris in the accommodation until all feeling is lost in his hands.
07:16	SANDRANDORE-SIR WILLIAM ALEXANDER going to Channel 6.
07:17	SIR WILLIAM ALEXANDER-HERCULES R307 to inform that the first SAR Tech is out of the water and the second is in.
07:18	SANDRANDORE-SYDNEY to request an update on their request. SYDNEY to follow-up with Ice HFX and JRCC.
07:20	ROC-SIR WILLIAM ALEXANDER to advise that a CCG Helicopter will depart Halifax at 0800 towards the SIR WILLIAM ALEXANDER to transport the two survivors to the Magdalen Islands.
07:23	SYDNEY-Ice HFX to follow up on the SANDRANDORE request for an escort to the Magdalen Islands. No resource available for ice escort at this time.
07:24	ROC-JRCC to relay information received from the SIR WILLIAM ALEXANDER to the effect that two victims have been recovered and that the diving operation is continuing. Discussion on the plan to have the SIR WILLIAM ALEXANDER proceed to Sydney and secure at port wharf where access can be restricted. It is agreed that JRCC will advise the Medical Examiner of the plan to have SIR WILLIAM ALEXANDER secure at Sydney Port. The ROC is also sending a CCG helicopter to the SIR WILLIAM ALEXANDER to take the two survivors to the Magdalen Islands. ROC is in the process of contacting the Transportation Safety Board and Transport Canada to see if they need the hull salvaged for investigative purposes.
07:26	Second SAR Tech out of the water.
07:26	SYDNEY-JRCC to follow-up on the SANDRANDORE request to call the Superintendent of SAR.
07:27	JRCC-ROC to advise that if all four crew members missing from LACADIEN II are not recovered, a search of the area will be required.
07:28	SANDRANDORE-SYDNEY to request a shore call. SYDNEY advises that there is no icebreaker available at this time to escort the fishing vessels at this time and that the request to contact the Superintendent of SAR is being processed.
07:29	Families contact person-JRCC to request an update. Two deceased crew members have been recovered but not identified yet. Dive operations are continuing but it is a slow process. The two survivors will be transported to the Magdalen Islands by CCG helicopter.

START TIME	EVENT, POSITION & NOTES
07:35	Third SAR Tech in the water; he first enters the water from the bow and then from the stern to continue the search inside the accommodations and locates and recovers the third victim.
07:48	JRCC-SIR WILLIAM ALEXANDER to confirm information received from the ROC and to request to keep them informed.
07:53	Third victim recovered from the water.
07:58	Third SAR Tech out of the water.
08:10	Fourth SAR Tech in the water; as he tries to enter the galley area, a large object had shifted and is blocking the way. As a result, he uses the last few minutes of his dive to search the rigging and deck area for the last crewmember.
08:13	Families contact person-JRCC to request an update. JRCC have nothing new to report.
08:21	Fourth diver out of the water diving Operation completed. Following consultation between the four SAR Techs and the commanding officer of the SIR WILLIAM ALEXANDER, the decision was made to end the dive operation considering the depth of the search conducted and the fact that the four SAR Techs are presenting symptoms of cold injury.
08:21	Superintendent of SAR requesting a shore to ship phone call through SYDNEY.
08:26	HERCULES R307 off scene heading to SYDNEY to refuel.
08:29	JRCC-Families contact person to provide an update on the third deceased recovered and the termination of the diving operation.
08:31	JRCC-ROC to provide an update and discuss searching for the missing person to ensure he has not drifted away undetected. Further discussion on what to do with the hull.
08:35	MADELINOT WAR LORD leaves to recover the SAR Techs parachutes.
08:39	RCMP H Division-JRCC to offer assistance.
08:48	SIR WILLIAM ALEXANDER releases L'ACADIEN II in position 46 41.46 N and 60 02.62 W.
08:52	JRCC-HERCULES R307 to discuss the requirement to search the area for the missing person and discussion of the return of the SAR Techs to Greenwood.
08:57	SIR WILLIAM ALEXANDER-JRCC to confirm that three deceased are onboard, that the hull has been released and is 75% submerged floating by the stern and to advise that they have heard a distress call from another vessel.
08:57	SYDNEY-JRCC to relay the information on the ANNIE MARIE who is stuck in ice and taking on water. A mayday relay has been broadcasted.
08:58	ROC-JRCC to provide information on the release of the hull. Neither TC nor TSB have requested to try to keep it afloat. It has been released. JRCC advises that a group of fishing vessels have decided to return to the Magdalen Islands and request ice breaking assistance.
09:01	SANDRANDORE-SIR WILLIAM ALEXANDER going to Channel 6.

START TIME	EVENT, POSITION & NOTES
09:10	JRCC tasked the CORMORANT R903 to drop a pump to the ANNIE MARIE and to proceed to the SIR WILLIAM ALEXANDER to pick up the SAR Techs.
09:12	CORMORANT R910 from Gander tasked to search for the missing person.
09:19	SYDNEY tries calling SIR WILLIAM ALEXANDER on channel 19 twice.
09:20	ROC-SIR WILLIAM ALEXANDER to communicate that the CCG Helicopter is delayed due to weather. The helicopter will now depart Halifax at 0945.
09:23	ROC-JRCC to advise that they will be issuing a notice to shipping for the hull and to ask when the SIR WILLIAM ALEXANDER will be released. The SIR WILLIAM ALEXANDER is required to stay on site until the CORMORANT R910 finishes the search and it may be tasked to the ANNIE MARIE.
09:27	RCMP provides contact information for lead investigator and will contact the medical examiner.
09:27	ROC-SYDNEY to issue the Notice to Mariner.
09:27	SIR WILLIAM ALEXANDER-SANDRANDORE going to Channel 6.
09:28	The SAR Techs and their equipment transferred from the MADELINOT WAR LORD to the SIR WILLIAM ALEXANDER.
09:29	SYDNEY-SIR WILLIAM ALEXANDER to request position ("46 40.5 N and 60 03 W") for CCG helicopter 354 who may be required to stop by the vessel to refuel. Discussion on other SAR cases including MADELINOT WAR LORD who still requires assistance (SYDNEY to call JRCC).
09:31	SYDNEY-JRCC to discuss general situation and to provide updates on the various SAR cases.
09:32	JRCC-Families contact person to advise that the dive operation is over and that they are now searching for the missing person. The victims will be transported to Sydney but no names can be provided at this time.
09:38	JRCC-SIR WILLIAM ALEXANDER to request the names of the victims. SIR WILLIAM ALEXANDER advises that MADELINOT WAR LORD is still a SAR case that requires some assistance.
09:49	JRCC-SIR WILLIAM ALEXANDER to request drift information for the search plan.
09:50	JRCC-CORMORANT R910 to issue instructions on search plan. Proceed to current position of the capsized vessel and search along the track line that was made through the ice for approximately five miles, and then return along the track again. If nothing is found during this search then complete a sector search with a two-mile radius around the capsized vessel.
09:50	HERCULES R307 departs Sydney towards Greenwood.
09:54	Transport Canada QC-MRSC to request a briefing on the situation.
09:55	The three victims are identified by the two survivors and witnessed by the first and second officer of the SIR WILLIAM ALEXANDER.
10:00	SANDRANDORE tries calling the Ferry CARIBOU on channel 16.

START TIME	EVENT, POSITION & NOTES
10:04	SIR WILLIAM ALEXANDER-JRCC to communicate the names of the deceased and information on the missing person. JRCC requests SIR WILLIAM ALEXANDER to deploy a self-locating datum marker buoy (SLDMB) on the ice to track the hull's drift.
10:10	SIR WILLIAM ALEXANDER tries calling the SANDRANDORE on channel 16.
10:11	Families contact person-JRCC to inform that the families are getting impatient to receive information. The Maritime coordinator will call back in 5 minutes.
10:14	JRCC-Families contact person - line is busy.
10:16	JRCC- Families contact person to provide names of deceased and missing person, to inform that the search is continuing and that the survivors will be flown home by CCG helicopter.
10:16	JRCC-SIR WILLIAM ALEXANDER to inform them of the CORMORANT R910 ETA (1230) and that the vessel is requested to remain on scene until the search is completed. The SIR WILLIAM ALEXANDER advises that L'ACADIEN II is still floating by the stern.
10:29	JRCC-RCMP to provide an update on the incident and to inform them that the deceased will be transported to Sydney and the survivors to the Magdalen Islands.
10:37	Ice HFX-SYDNEY to request position of the SANDRANDORE.
10:38	SYDNEY-SANDRANDORE to request position ("46 50.17 N and 59 46.97 W"). SANDRANDORE requests the location of the edge of the ice pack.
10:41	SYDNEY-Ice HFX to pass on the position of the SANDRANDORE and to request the location of the edge of the ice pack (47 08 N and 59 42 W).
10:43	RCMP-JRCC to discuss situation and to ask about a platform for the security operation. JRCC informs them that such a request has to be addressed to the ROC.
10:44	JRCC-SYDNEY to request an ETA for CCG helicopter 361 to the SIR WILLIAM ALEXANDER.
10:45	SYDNEY tries calling CCG helicopter 361 twice on channel 26 and twice on channel 16.
10:48	SIR WILLIAM ALEXANDER-JRCC to inform them that the SLDMB has been deployed, that the two survivors have been cleared to fly by the SAR Techs and that the ETA of the survivors to the Magdalen Islands will be communicated once the helicopter leaves the vessel.
10:48	CORMORANT R903 tries calling SIR WILLIAM ALEXANDER on channel 16.
10:48	SYDNEY-SANDRANDORE to relay the information on ice. SANDRANDORE mentions the fact that SYDNEY should be a bilingual station and SYDNEY confirms that they are a bilingual radio station and they can switch to French.
10:48	CORMORANT R903 tries calling SIR WILLIAM ALEXANDER.
10:49	CORMORANT R903-SYDNEY to request that the SIR WILLIAM ALEXANDER be made aware that the helicopter is six minutes away from the vessel.
10:49	SYDNEY tries to call SIR WILLIAM ALEXANDER on channel 16 and 19.
10:54	SYDNEY-Ice HFX to seek an update on the SANDRANDORE's request; the Ice office is assessing which ship will assist.

START TIME	EVENT, POSITION & NOTES
10:57	SYDNEY-SANDRANDORE to inform him that there will be assistance once they identify the icebreaker.
10:57	HERCULES R307 arrives at Greenwood.
10:58	SYDNEY-JRCC to advise that CCG helicopter 354 had assessed the ANNIE MARIE has and is now proceeding to the SIR WILLIAM ALEXANDER. CORMORANT R903 is flying from SYDNEY to the SIR WILLIAM ALEXANDER to pick up the SAR Techs to proceed to Greenwood.
10:58	SYDNEY-JRCC to provide an update on resources in use in the area
11:00	JRCC-ROC to request an update on the helicopter tasked to bring the survivors home (CG 361). Helicopter is en route. ETA Port Hawkesbury for refuelling is 1129. It will then proceed to the SIR WILLIAM ALEXANDER.
11:03	JRCC-CORMORANT R910 to provide an update. ETA is one hour and twenty minutes to the scene.
11:07	JRCC-SYDNEY to inform that CCG helicopter 361 will be landing in Port-Hawkesbury to refuel in about 20 minutes.
11:11	Ice HFX-SYDNEY to request names of the seven vessels that are waiting for an escort.
11:19	CCG helicopter 361 ETA to the SIR WILLIAM ALEXANDER is 1240.
11:21	CORMORANT R903 has departed the SIR WILLIAM ALEXANDER with the SAR Techs towards Greenwood.
11:25	Ice HFX-SYDNEY to inform that the EDWARD CORNWALLIS will be tasked to escort the seven fishing vessels. Position of the fishing vessels is 49 59 N and 63 01 W.
11:26	ROC-JRCC to inform that the EDWARD CORNWALLIS, currently north of Anticosti Island, will proceed to assist the fishing vessels back to the Magdalen Islands and that the GEORGE R PEARKES, currently in the Burgeo area, will transit towards Sydney to replace the SIR WILLIAM ALEXANDER.
11:28	JRCC- Families contact person to provide an update and to request more information on the missing person. The liaison role (Families contact person) will now be assumed by the SQ. It is agreed that once the deceased and the missing person case is handed to the RCMP, SQ will deal directly with the RCMP.
11:34	SYDNEY- SANDRANDORE to request the names of the other fishing vessels that need an escort.
11:36	JRCC-SIR WILLIAM ALEXANDER to request seawater temperature (+0.75 C) and to discuss CCG helicopter 361 status.
11:46	SYDNEY-Ice HFX to relay the names of the fishing vessels that need assistance.
11:56	SANDRANDORE tries to call the SIR WILLIAM ALEXANDER.
11:58	SANDRANDORE-SYDNEY going to channel 26.
12:01	CORMORANT 910-SYDNEY to inform that they are 30 minutes away and to request an update.

START TIME	EVENT, POSITION & NOTES
12:02	SYDNEY-JRCC to inform them of the ETA of the CORMORANT 910. JRCC requests that CORMORANT 910 contacts the SIR WILLIAM ALEXANDER for drift information.
12:04	SYDNEY-CORMORANT 910 to request that they contact SIR WILLIAM ALEXANDER.
12:20	CORMORANT R910 on scene commencing the search.
12:24	JRCC-SIR WILLIAM ALEXANDER to confirm that SIR WILLIAM ALEXANDER has assumed the role of on scene coordinator and to provide drift information to the CORMORANT R910.
12:27	SQ-JRCC to provide information on the missing person. JRCC provides a briefing on the past, current and next steps. SQ agrees to brief the families with this information. Discussion on the internal search of L'ACADIEN II and reaffirmation that the dive operations have ended. The search is now concentrating on the open water and ice floes in the area and this search will be reduced at 1700 if nothing else is found. JRCC also re-affirms that SIR WILLIAM ALEXANDER will be taking the deceased to Sydney and provides the name and contact number of the RCMP officer responsible for receiving them.
12:50	SIR WILLIAM ALEXANDER-JRCC to advise that CCG helicopter 361 is now on deck and will proceed to the Magdalen Islands with the survivors.
12:53	JRCC-SQ to notify that the CCG helicopter is preparing to leave the SIR WILLIAM ALEXANDER with the two survivors towards the Magdalen Islands and that there is no need for an ambulance at their arrival. JRCC also mentions that there is no development on the search for the missing person.
13:21	JRCC-ROC to brief on planned search reduction for 1700 and to discuss the next step which is the salvage of the hull. ROC advises that they have no plans at this time and that salvage is not part of the mandate of CCG. Discussion on assignment of vessels; GEORGE R PEARKES to assume SAR, EDWARD CORNWALLIS to go to the Magdalen Islands and DES GROSEILLIERS assigned to security operations.
13:29	SIR WILLIAM ALEXANDER-JRCC to advise that CCG helicopter 361 has departed. The ETA Magdalen Islands is 1415. The CORMORANT R910 should be finished searching in approximately one hour. MADELINOT WAR LORD is heading east to stand by with another vessel. JRCC anticipates to stand down the SIR WILLIAM ALEXANDER around 1700 after the search is reduced.
13:34	JRCC-SQ to advise of CCG 361 ETA to Magdalen Islands airport.
13:41	ROC-JRCC to request an update. JRCC intends to send the SIR WILLIAM ALEXANDER towards SYDNEY after escorting the MADELINOT WAR LORD to open water. JRCC also confirms that the SIR WILLIAM ALEXANDER is not tasked to the ANNIE MARIE SAR case.
13:48	CORMORANT R910 advises that they have 25 minutes left on scene before going to SYDNEY to refuel.
13:53	CORMORANT R903 in Greenwood.
13:58	JRCC-ROC to advise that they intend to task the GEORGE R PEARKES to assist the ANNIE MARIE.

START TIME	EVENT, POSITION & NOTES
14:01	JRCC-RCMP to provide information on search reduction plan and on the two survivors for the purpose of the RCMP investigation.
14:30	CORMORANT R910 ends search and departs the scene.
14:48	CCG helicopter 361 departing the Magdalen Islands for Halifax.
14:52	SYDNEY-JRCC to advise that the crew of ANNIE MARIE is abandoning the vessel. JRCC tasks CORMORANT R910 to the scene.
14:53	JRCC-SIR WILLIAM ALEXANDER to advise that ANNIE MARIE is abandoning ship. SIR WILLIAM ALEXANDER offers to proceed and assist but JRCC mentions that the ice is thick enough to abandon to it and that CORMORANT R910 has been tasked. SIR WILLIAM ALEXANDER advises that R910 has departed for SYDNEY to refuel and that CCG helicopter 354 is on its way to the DES GROSEILLIERS.
14:55	CORMORANT R910 landed in SYDNEY to refuel. They will proceed to the location of ANNIE MARIE.
15:01	JRCC-SYDNEY to request position of CCG helicopter 354 for possible tasking to ANNIE MARIE.
15:20	SYDNEY-JRCC to advise that ANNIE MARIE's crew has now abandoned. The EPIRB has been activated.
15:35	CORMORANT R910 en route to the location of ANNIE MARIE. It will transport the crew to the Magdalen Islands.
16:48	CORMORANT R910 has the crew from the ANNIE MARIE onboard and is proceeding to the Magdalen Islands.
16:59	RCMP-JRCC requesting information on the L'ACADIEN II since they are having difficulties communicating with the SQ (language problems).
17:02	DES GROSEILLIERS-JRCC to provide an update on the escort of GINNY CR and NADINE D. GINNY CR is being towed by ROUGH RIDER and LADY MAGGIE is towing NADINE D.
17:02	JRCC-SIR WILLIAM ALEXANDER to release SIR WILLIAM ALEXANDER from L'ACADIEN II SAR case. SIR WILLIAM ALEXANDER advises that MADELINOT WAR LORD has departed but SIR WILLIAM ALEXANDER will confirm that he needs no further assistance from the CCG before proceeding to Sydney.
17:12	SIR WILLIAM ALEXANDER-JRCC to advise that MADELINOT WAR LORD is proceeding under her own power towards the Magdalen Islands with another vessel and does not require any further assistance. JRCC releases SIR WILLIAM ALEXANDER from the MADELINOT WAR LORD SAR case and will ask SYDNEY to set up a communications schedule to ensure that the MADELINOT WAR LORD makes it safely to port. SIR WILLIAM ALEXANDER will get a last position for the L'ACADIEN II hull then will depart for Sydney.
17:13	SYDNEY-JRCC to advise that SANDRANDORE is requesting information on transfer of the victims to the Magdalen Islands. JRCC advises that the RCMP has jurisdiction and will receive the deceased at Sydney.

START TIME	EVENT, POSITION & NOTES
17:17	SIR WILLIAM ALEXANDER-JRCC to inform them that the tow operation with L'ACADIEN II lasted two hours and seventeen minutes for a distance of six nautical miles.
17:19	JRCC-RCMP to transfer the case responsibility and to inform them that SIR WILLIAM ALEXANDER is proceeding to Sydney. JRCC advises the RCMP that they should communicate directly with the vessel from now on and that they should contact the SQ to inform them of the transport of the victims.
17:51	RCMP confirms they have been in direct contact with SQ in the Magdalen Islands concerning the victims being transported to Sydney; JRCC requests confirmation that the SQ has advised the families.
18:07	JRCC receives a call from a RCMP officer from the Magdalen Islands. He has been getting enquiries concerning the deceased persons. The RCMP officer is briefed on the plan for SIR WILLIAM ALEXANDER to proceed to Sydney with the three deceased. The officer advises that there is a language problem in trying to communicate with the RCMP in Halifax, so JRCC provides contact information for the Sydney RCMP. The officer also states that the families have called him looking for information and that they are impatient because they have not had any information for twenty hours. JRCC advises that SQ had been briefed regularly.
20:56	SIR WILLIAM ALEXANDER in Sydney. The victims are released to the RCMP.

ANNEX F – LIST AND DESCRIPTION OF INVESTIGATIVE AND TECHNICAL RESEARCH CONDUCTED

# 1	Night time demonstration of craft off stern of CCGS SIR WILLIAM ALEXANDER
# 2	Day time tow trial of 47' Rescue Cutter by CCGS MARTHA BLACK
# 3	Stability modeling of tow & environmental conditions contributing to perpendicular strain and capsize
# 4	Bedford Basin day time tow trial using a vessel with a similar hull form to L'ACADIEN II by CCGS EDWARD CORNWALLIS
# 5	Day time tow trial of the sister ship to the L'ACADIEN II by CCGS MARTHA L. BLACK
# 6	Day time tow trial of Coast Guard barge contacting ice
# 7	Day time trial of CCGS SIR WILLIAM ALEXANDER towing a small vessel and one of a similar hull form of L'ACADIEN II

Note: A video of the demonstration of a Coast Guard barge contacting ice and an animation of various scenarios of the capsize of L'ACADIEN II is enclosed.

ANNEX G – BACKGROUND AND HISTORY OF SEALING

Seals have been hunted for food, fuel, shelter, fur and other products for hundreds of years. Seal products consist of leather, oil, handicrafts, and meat for human and animal consumption as well as seal oil capsules rich in Omega-3. It is an important revenue source for some fishers and an integral part of their way of life.

Although seals have been hunted commercially for hundreds of years, the current Atlantic coast commercial seal hunt took shape following the report of the Royal Commission on Seals and Sealing in Canada (the Malouf report). As a result, the Minister of Fisheries and Oceans announced prohibitions on:

- the use of vessels over 65' (19.8 metres) in length for hunting purposes. This length limit was imposed to give greater opportunity to small vessels, which had been unable to compete with the larger vessels.
- the commercial hunt of whitecoats (harp seals that have not begun to moult, which occurs at about 10 to 14 days of age); and
- the commercial hunt of bluebacks (hooded seals that have not begun to moult, which occurs at about 15 to 16 months of age).

In 1993, the **Marine Mammal Regulations (MMR)** were established to replace several sets of regulations. These regulations included the current prohibition on the sale, trade, or barter of whitecoats and bluebacks. The commercial hunt is now carried out using vessels 35'-65' in length and small vessels under 35' in length. Where there is solid ice and seals are close to shore, sealers may hunt on foot or using snowmobiles.

The season for the commercial hunt of harp and hooded seals is established in consultation with sealing fleets and set out in Variation Orders pursuant to the MMR, taking into account environmental and biological conditions. It can be adjusted by Variation Orders to accommodate changing circumstances. The majority of sealing occurs between late March and the end of April, beginning around the third week in March in the southern Gulf of St. Lawrence, and about the second week in April off Newfoundland (the Front).

By controlling the season's opening date, the Department of Fisheries and Oceans ensures that harvesting does not begin until a critical mass of these pups have reached 25 days of age, the point at which they can swim and find food. The season's closing date is more fluid; it is only announced once local quotas have been met.

Seal hunting is a competitive activity for quotas allocated by species, by zone and by vessel class. There are no individual quotas for licence holders therefore; the money earned depends on how quickly an individual can harvest the maximum number of seals before the year's quota is met.

ANNEX H - LEXICON

H.1 GLOSSARY OF TECHNICAL TERMS:

ABEAM – 90 degrees to either port or starboard.
(par le travers)

AMIDSHIPS – for the helm, the middle fore-and-aft position, neither to port nor to starboard. Set amidships, a vessel underway should theoretically go straight ahead. (droit devant)

BARE STEERAGEWAY – a nautical term describing the absolute minimum power and speed setting possible to retain the rudders capacity to change course. The rudder is dependent on the flow of water across it to act as a fulcrum to move the head or bow of the vessel, just as an airplane's wing requires sufficient air flow to deliver lift. Larger vessels with greater weight and momentum require more speed to maintain steerage. A vessel that is going slower than the speed required for the rudder to impart motion is said to have lost steerageway. (erre de gouverne minimale)

BASELINE ASTERN – The imaginary line running from the towing fairlead of the CCGS SIR WILLIAM ALEXANDER directly astern of the ship. A position 180° on either bow, directly aft. (ligne de reference vers l'arrière)

BITT, BOLLARD – is a post or pair of posts fixed on the deck of a ship for securing lines. (bitte, bollard)

BOS'N – the senior seaman on board a Coast Guard vessel. (maître d'équipage)

BREAKABLE LINK – is a metal fitting in the towing gear which is designed to fail under a specific pre-determined load or strain. (maillon à mécanisme de rupture)

BRIDLE – The bridle is a Y-shaped arrangement at the end of the tow, meant to be attached to both port and starboard bow fittings, or both the left and right side of the forward part of the vessel. (patte d'oie)

BROAD – describes a position 45-60 degrees from an imaginary line running directly astern of the CCGS SIR WILLIAM ALEXANDER. (hanche)

BULLNOSE – The absolute forward part of the vessel, the point where the port and starboard bow come together.

CABA – Compressed Air Breathing Apparatus. The new terminology for the older and more familiar SCUBA, Self Contained Breathing Apparatus. (ARAC)

CATENARY – the curve assumed by a cord of uniform density and cross section that is perfectly flexible but not capable of being stretched and that hangs freely from two fixed points. The catenary is the theoretical shape of a hanging flexible chain or cable when supported at its ends and acted upon by a uniform gravitational force (its own weight) and in equilibrium. The curve has a U shape that is similar in appearance to the parabola, though it is a different curve. (caténaire)

CLOSE – is the nautical term for 'approach', as in 'close the distance'. (se rapprocher)

DOWN-RIGGER – A weighting device made of weights and cable which would lower the drogue below the ice, so as to avoid it being snagged and damaged. (lest automatique)

DROGUE – a drag, typically of canvas, thrown overboard to retard the drifting or yaw of a vessel. (ancre flottante) (lest automatique)

EVOLUTION – common naval term. It is used to encompass the conduct of a nautical activity. Coming alongside a berth, doing buoy work, launching a helicopter, conducting a tow are all 'evolutions'. It is used in a similar fashion to the word 'exercise', but is meant to describe the work being done rather than the learning being achieved. (operation)

FAIRLEAD – a block, ring, or strip of plank with holes that serves as a guide for the running rigging or any ship's rope and keeps it from chafing. (chaumard)

FRC – Fast Rescue Craft. (ERS)

GALE - A strong maritime storm with powerful winds.

GIRDING – A danger of capsize resulting from the disparate size of two connected vessels, normally a scenario with a small tug and a large towed vessel such as a tanker or bulk carrier. (coup de vent)

HAWSER – The nautical term for the rope or wire cable used in towing a vessel at sea. With smaller vessels, it is interchangeable with TOW-LINE. (aussière)

HELM – a lever or wheel controlling the rudder of a ship for steering; broadly: the entire apparatus for steering a ship. (barre)

HULK – an abandoned wreck or shell. (épave)

IN EXTREMIS – in extreme circumstances (in extremis)

LADEN – describes a vessel with a full fuel load, provisions and equipment. With no fuel or equipment, the vessel could be described as 'light'. With a full catch the vessel might be described as 'heavily laden' or with a 'full load'. This range of weight affects how deeply the vessel sits in the water and has implications for the stability of the vessel. en charge)

LEE SHORE – The downwind shore. The implication being that a lee shore is dangerous in a storm due to the potential of being blown onto shore or aground. (sous le vent)

LIST – to tilt to one side; *especially of a boat or ship*: to tilt to one side in a state of equilibrium (as from an unbalanced load). (gîte)

PORT BEAM – Measured from the bow, or the head of L'ACADIEN II, 90 degrees to port, or to the left. (par le travers bâbord)

PASSING OF THE TOW – the seaman's term for sending the gear used for towing across from CCGS SIR WILLIAM ALEXANDER to the L'ACADIEN II.

PORT QUARTER – *A position at an angle off the stern between the beam (90°) and astern (180°).*

RAM – an acronym for restricted in the ability to manoeuvre, is a term found in the Collision Regulations which succinctly describes the inability of a vessel to control its own movements. In the context of the rules, it describes an inability to act in accordance with the rules to avoid collision. The context of the term is equally applicable to the L'ACADIEN II. (capacité de manoeuvre restreinte)

ROC – Regional Operations Centres. (COR)

SAMSON BRAID – is a woven synthetic rope noted for its strength and limited elasticity. In towing, a positive characteristic of the line is that if broken or parted under strain, it has a tendency to simply fall limp. (Samson braid)

SCREW – In large ships, the term 'screw' is used in lieu of propeller. (hélice)

SHACKLE – is a metal fitting that links the bridle to the actual towing hawser or towline. (manille)

SHEER – to deviate from a course, to swerve. (embardée)

SILOS – The organizational slang or jargon, applied within many organizations and agencies including government, to describe cultural, specialty or activity-based communities which commonly fail to interface effectively with the organizational environment around them. (cloisonnements)

STABILITY CURVES – Essentially all commercial and government vessels have stability curve calculations developed for them during the building process. In designing a vessel, its role and the likely conditions for its employment, the curves predict and display stability and potential load conditions. (courbes de stabilité)

STAND OFF – A nautical term, describing close-by, but not on top of the L'ACADIEN II, and always within visual range. (se tenir à l'écart)

STARBOARD – is to the right. Port is to the left. (tribord)

STERN – the absolute after end of the ship. (poupe)

STRICKEN – “made incapable or unfit” as in “the rescuers were sent to the *stricken* ship.” (accidenté)

STROP – a rope with its ends spliced to form a circle or eye. Used in lifting cargo and in salvage work. (courroie d'arrimage)

SWELL – a remnant of waves from over the horizon. A wave is produced by the local winds. Waves can sit atop a swell, indeed mixed swells are possible, arriving at a location simultaneously from different direction. This delivers what is known as a ‘confused swell’. (houle)

TOWING FAIRLEAD - The towing Fairlead is essentially a reinforced steel eye built into the afterdeck at the very after end of the ship. The towing hawser is passed through it before leading to the tow. Its role is to prevent movement of the towline back and forth as the towed vessel may yaw, or swing back and forth. It also has a rounded shape, meant to minimize chafing or wear on the towline. (chaumard de remorquage)

TRANSPONDER – is a floating buoy with a radio signal transmitter. It has a long battery life and is usually employed to assess drift, the movement caused by the combined effects of wind, wave and current. (transpondeur)

TENSIONOMETER – A tension measuring device which releases the strain on the tow-line at a predetermined point, meant to preclude parting the tow or a girding situation. (tensiomètre)

WAY OFF – Coming to a stop. Zero speed through the water. (casser son erre)

VHF, or Very High Frequency – is short-range, line-of-sight radio communications. (VHF ou très haute fréquence)

WORKING CHANNEL – The VHF radio band provides mariners with line-of-sight communications on radio consoles and hand-held devices. Some channels are formally assigned for specific purposes such as CH 16 for calling and distress. A working channel is an unassigned channel/frequency where general conversation between mariners can be conducted. (voie de travail)

YAW – side to side movement, or the extent of the movement in yawing. (embarquée ou mouvement en lacets)

H.2 GLOSSARY OF ICE TERMS:

An extensive glossary of ice terms and definitions can be found at:

http://www.nrlmry.navy.mil/forecaster_handbooks/Arctic/Forecasters%20Handbook%20for%20the%20Arctic%20Appendix%20A.pdf

9/10^{ths} ICE COVERAGE – Ice coverage is described in tenths, thus 9/10^{ths} is just shy of 100% coverage. (couverture glaciaire de 9/10^e)

AFTERDECK (OR QUARTER DECK) – is at the stern of the ship or vessel. Interchangeable with ‘towing deck’, it is where the two seamen acting as lookouts and serving primarily as the towing watch were located. (plage ou pont arrière)

AGED RIDGE – Ridge that has undergone considerable weathering. These ridges are best described as undulations. (vieille crête)

ANCHOR ICE – Submerged ice attached or anchored to the bottom, irrespective of the nature of its formation. (glace de fond)

BARE ICE – Ice without snow cover. (glace vive)

BELT – A large feature of pack ice arrangement that is longer than it is wide, from 0.5 mi to 65 mi (1-100 km) in width. (ceinture)

BERGY BIT – A large piece of floating glacier ice, generally showing less than 16 ft (- 5 m) above sea level but more than 3 ft (1 m) and normally about 120 to 360 sq yds (t 100-300 sq m) in area. (fragment de glace)

BESET – Situation of a vessel surrounded by ice and unable to move. (coincé)

BRASH ICE – Small fragments of ice in water. (sarrasins)

CLOSE PACK ICE – Pack ice in which the concentration is seven-tenths to eight-tenths, composed of floes mostly in contact. (banquise serrée)

DEFORMED ICE – A general term for ice that has been squeezed together and, in places, forced upwards (and downwards). Subdivisions are rafted ice, ridged ice, and hummocked ice. (glace déformée)

FAST ICE – Sea ice that forms and remains fast along the coast, where it is attached to the shore, to an ice wall, to an ice front, between shoals or grounded icebergs. Vertical fluctuations may be observed during changes of sea level. Fast ice may be formed on site from sea water or by freezing of pack ice of any age to the shore, and it may extend a few yards (meters) or several hundred miles (kilometres) from the coast. (banquise côtière)

FINGER-RAFTED ICE – Type of rafted ice in which floes thrust "fingers" alternately over and under the other. (glace imbriquée)

FLOE – Any relatively flat, isolated piece of sea ice 65 ft (= 20 m) or more across. (floe) Floes are subdivided according to horizontal extent as follows:

GIANT: over 5.5 nm (10 km)

VAST: 1-5.5 nm (2-10 km)

BIG: 550-2200 yd (500-2000 m)

MEDIUM: 110-550 yd (100-500 m)

SMALL: 22-110 yd (20-100 m)

HAWSER – The nautical term for the rope or wire cable used in towing a vessel at sea. With smaller vessels, it is interchangeable with TOW-LINE. (aussière)

HUMMOCKED ICE – Sea ice piled haphazardly one piece over another to form an uneven surface. When weathered, it has the appearance of smooth hillocks. (hummocked ice)

LEAD – A line of open water through pack ice. Any fracture or passageway through sea ice that is navigable by surface vessels. (chenal)

ICEBERG – A massive piece of ice of greatly varying shape, more than 16 ft (5 m) above sea level, which has broken away from a glacier, and which may be afloat or aground. Icebergs may be described as tabular, dome-shaped, sloping, pinnacled, weathered, or glacier bergs. (iceberg)

ICE CAKE – Any relatively flat piece of sea ice less than 22 yds (20 m) across. (glaçon)

ICE FLOE – Frozen sea, generally low and flat-topped. (ice floe)

OPEN WATER – A large area of freely navigable water in which sea ice is present in concentrations less than one-tenth. When no sea ice is present, the area should be termed ice free, even though icebergs occur. (eau libre)

PACK ICE – Term used in a wide sense to include any area of sea ice, other than fast ice, no matter what form it takes or how it is disposed. 5/10, Pack ice covering half the sea. (banquise)

PANCAKE ICE – Predominantly circular pieces of ice from 1 to 10 ft (30 cm-3 m) in diameter and up to about 4 in (- 10 cm) in thickness, with raised rims due to the pieces striking against one another. It may be formed on a slight swell from grease ice, shuga, or slush, or as a result of the breaking of ice rind, nilas, or, under severe conditions of swell or waves, of gray ice. Sometimes pancake ice forms at some depth, at an interface between water bodies of different

physical characteristics, from where it floats to the surface; it may cover wide areas of water rapidly. (glace en crêpes)

PRESSURE RIDGE – Floes forced up by pressures of moving pack ice. (crête de pression)

RAFTED ICE – Type of deformed ice formed by one piece of ice overriding another. (glace empilée)

RIDGING - The pressure process by which sea ice is forced into ridges. (formation de crêtes)



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